ST, 1958

ts, page 664

RUBBER WORLD

SERVING THE RUBBER INDUSTRY SINCE 1889

Semi-Continuous Urethane Foam Molding Line (page 733)

LL BROTHERS

LICATION

HALOGENATION OF BUTYL RUBBER

By R. T. Morrissey, page 725

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VOLUME 138, NUMBER 5 AUGUST, 1958

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Cover Photo: Courtesy of E. I. du Pont de Nemours & Co., Inc.

The opinions expressed by our contributors do not necessarily reflect those of our editors

FEATURE DEPARTMENTS

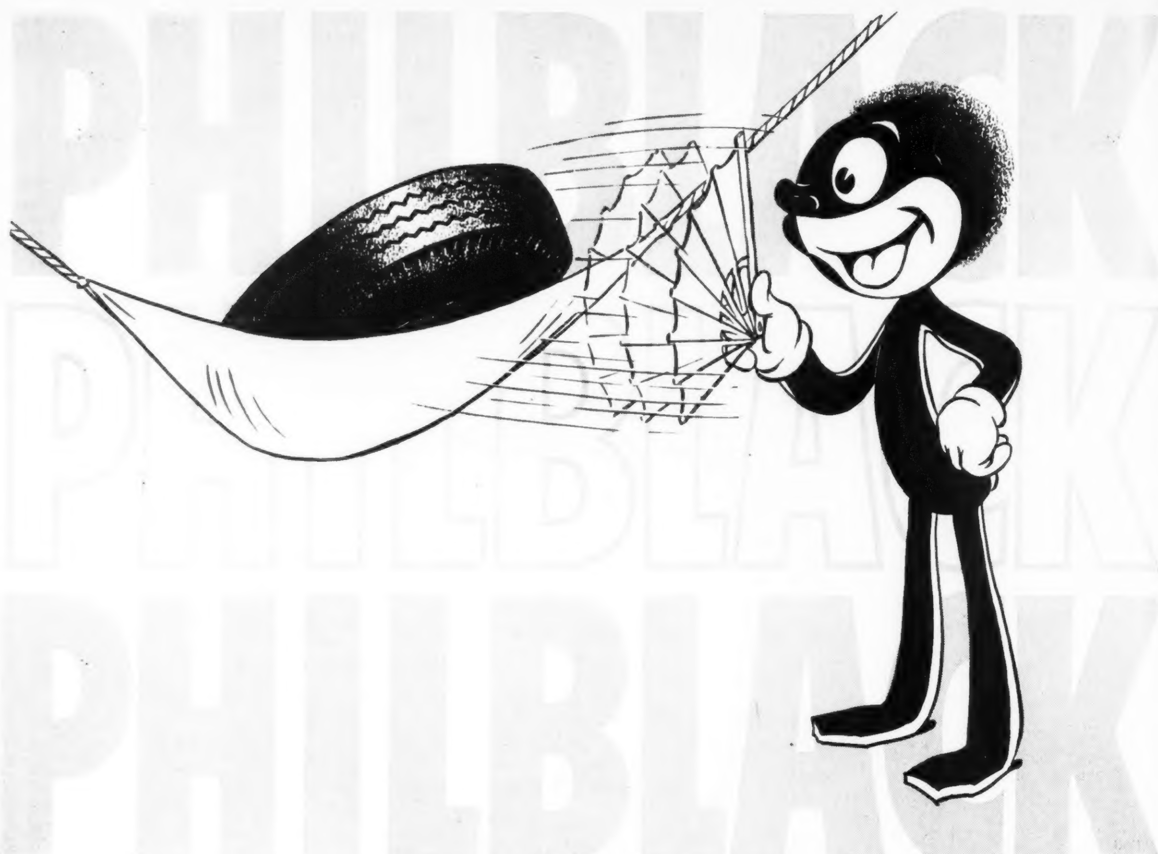
PHILBLACK
PHILBLACK
PHILBLACK

Photo courtesy of the New Jersey Rubber Company, Taunton, Mass.

One thing all America is soled on

The first steps in the development of a synthetic shoe sole were taken in the early 1930's. It was introduced commercially shortly after World War II. Since that time, this lightweight, waterproof, long-wearing blend of synthetic rubber and resin has grown in acceptance to where it is now used on just about 65% of all shoes of all types produced in these United States. And its use is still spreading.

Constant improvement in both raw materials and compounding techniques has been the key to the success of these soles. It's also the reason why PLIOFLEX rubber and PLIOLITE S-6B, the reinforcing resin by Goodyear, are so widely used by sole manufacturers.

The main advantage of PLIOFLEX in shoe soles is its unusually light color and high uniformity. With PLIOLITE S-6B, the advantages lie in superior processability and reinforcing properties. And with both materials, there's unmatched technical assistance and service.

If you are looking for top-quality shoe soles or any rubber product where hardness, stiffness, or toughness properties are important, be sure you have the full story on PLIOFLEX and PLIOLITE S-6B. It's yours simply by writing Goodyear, Chemical Division, Dept. T-9418, Akron 16, Ohio.

CHEMICAL
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DIVISION

RUBBER &
RUBBER CHEMICALS
DEPARTMENT

CHEMIGUM • PLIOFLEX • PLIOLITE • PLIO-TUF • PLIOVIC • WING-CHEMICALS

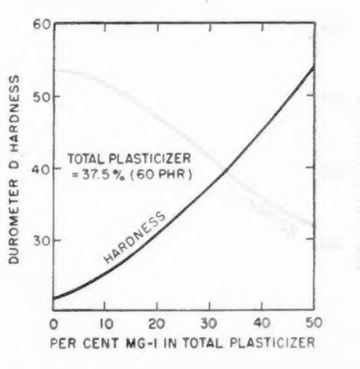
High Polymer Resins, Rubbers, Latices and Related Chemicals for the Process Industries

Plastisols with MONOMER MG-1 make new hard vinyl plastics

Now, with Monomer MG-1, you can make plastisol-fabricated vinyls with a hardness range never before possible. This means MG-1 may improve such products as:

- *flooring*
- *doll parts*
- *toys and balls*
- *wire and rack coatings*
- *tank linings*
- *foams and sponges*
- *gaskets*
- *and other products that require hard vinyl plastics made by plastisol techniques.*

Here's why! Monomer MG-1 is a high-boiling, low viscosity dispersant for polyvinyl chloride resins. Fluid plastisols are prepared with MG-1 in combination with conventional plasticizers. MG-1 polymerizes during the normal plastisol fusion cycle to produce hard plastics. The concentration of MG-1 controls the flexibility or rigidity of the finished product. This graph shows the effect of MG-1 on plastisol films.



Plastisol fabricated vinyls made with Monomer MG-1 also have these outstanding properties:

- *improved oil extraction resistance*
- *reduced "rub-off"*
- *improved electrical properties*
- *reduced volatile loss*
- *increased gloss*
- *improved scuff resistance*

U. S. Patent 2,618,621 covers the use of Monomer MG-1 in vinyl chloride dispersions. This patent is now being licensed by UNION CARBIDE.

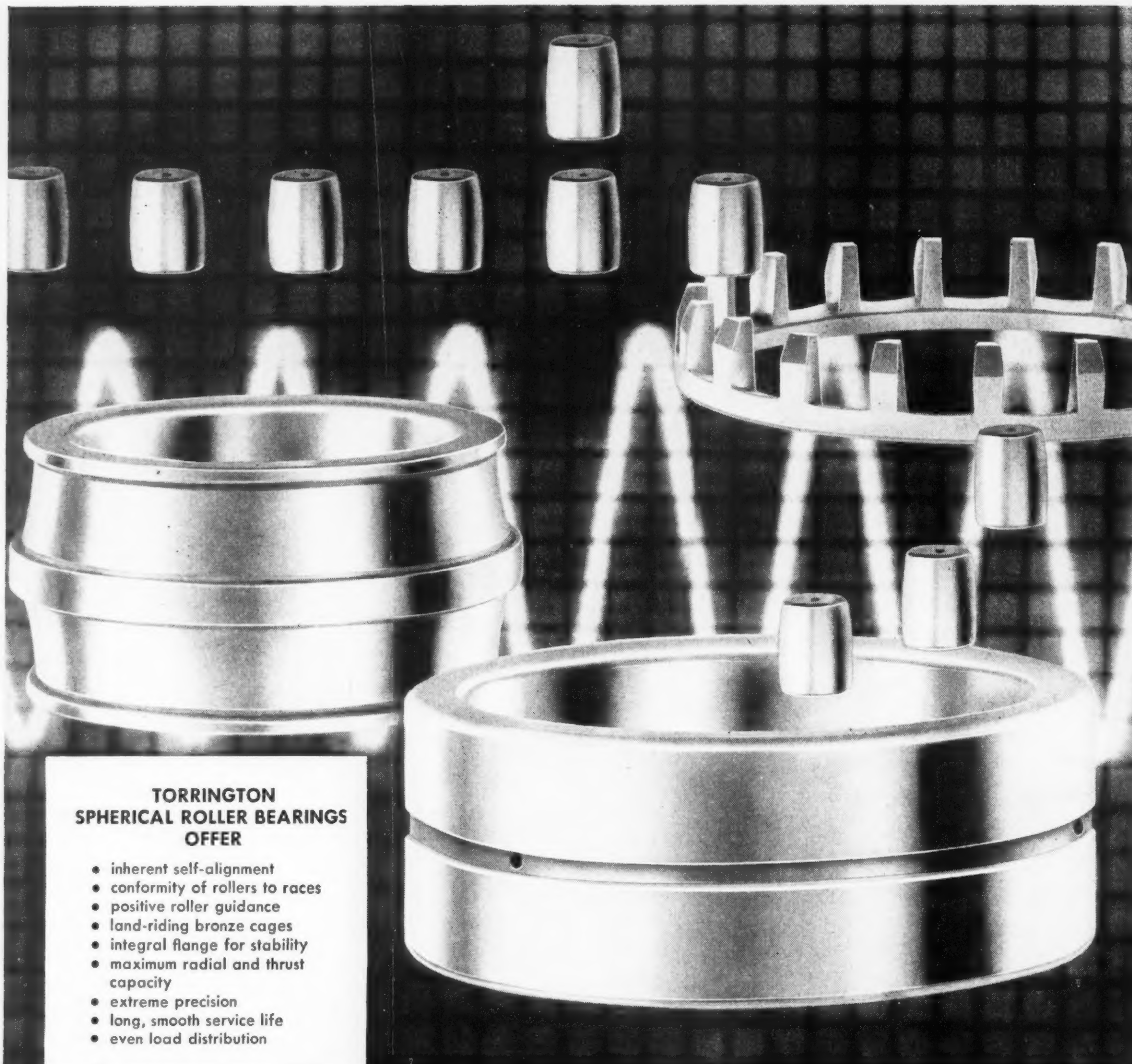
If plastisol fabrication is your business, Monomer MG-1 may open new markets for you. Write for technical data, samples, and licensing information. Address Union Carbide Chemicals Company, Department B, 30 East 42nd Street, New York 17, New York. In Canada: Carbide Chemicals Company, Division of Union Carbide Canada Limited, Toronto.

"Union Carbide" is a registered trade-mark of Union Carbide Corporation.

UNION CARBIDE

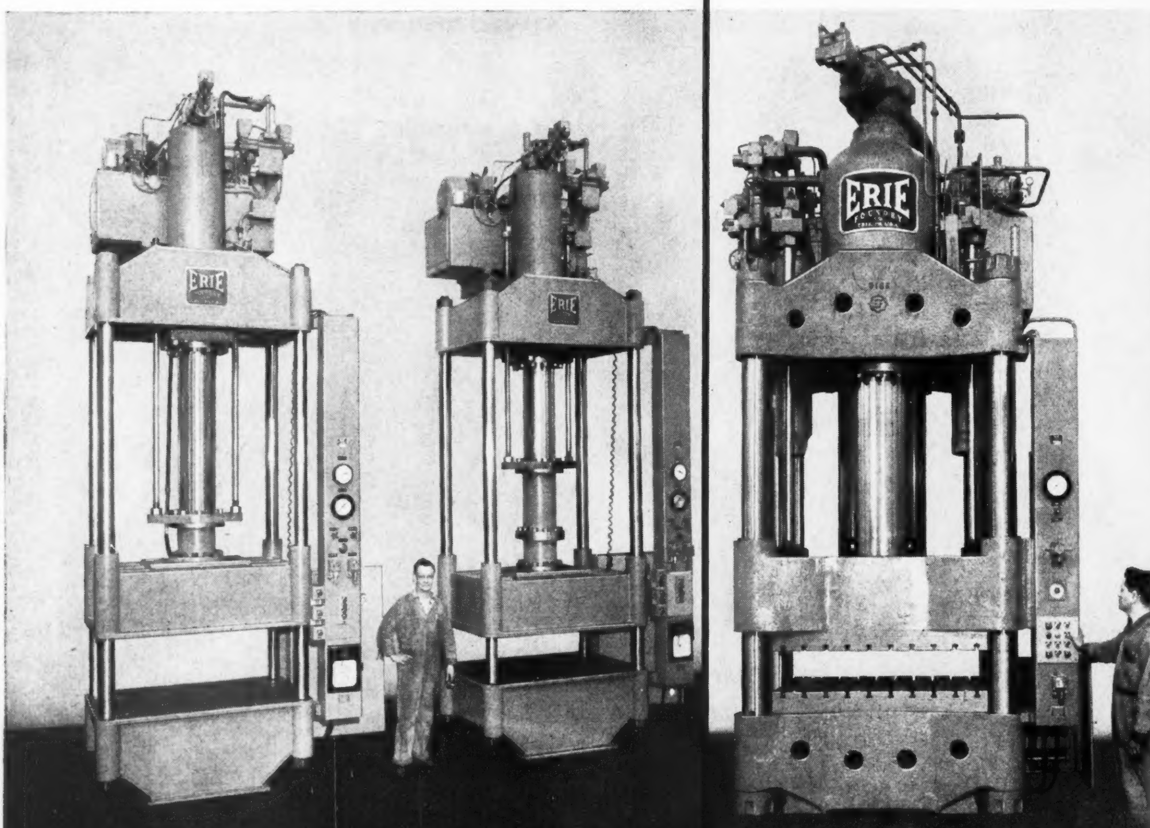
CHEMICALS

Union Carbide Chemicals Company
Division of Union Carbide Corporation
30 East 42nd Street, New York 17, N. Y.


TORRINGTON
SPHERICAL ROLLER BEARINGS
OFFER
• inherent self-alignment
• conformity of rollers to races
• positive roller guidance
• land-riding bronze cages
• integral flange for stability
• maximum radial and thrust capacity
• extreme precision
• long, smooth service life
• even load distribution

These two 150-ton fiberglass molding presses offer 48" stroke . . . 54-ton pull back. When desired, the opening can be reduced by ram spacers which, in this case, are 12" and 24". The Oil Gear drive offers molders a very accurate pressing speed adjustment . . . the ultimate possible. Controls are semi-automatic; plates are 56" x 42". Your maintenance men will welcome the minimum piping and valving on these self-contained presses.

This very rugged fiberglass press is rated 750 tons with a 48" stroke. The two pull backs give 150-ton stripping capacity. Oil Gear drive with quick-acting prefill system allows molders to utilize five ram speeds in their molding cycle. Automatic short stroking of pump at required pressures for long periods of time assures both reduced h.p. consumption and oil heating. Controls are semi-automatic, and the 2 steam-heated platens are 60" x 46".



THERE'S AN ERIE PRESS for EVERY FIBERGLASS MOLDING JOB

Whatever your molding needs, plastic, fiberglass or rubber, why not consult Erie Foundry before you plan? We can be of great help.

For more information, please write:

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ERIE 8, PA.

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SINCE 1895

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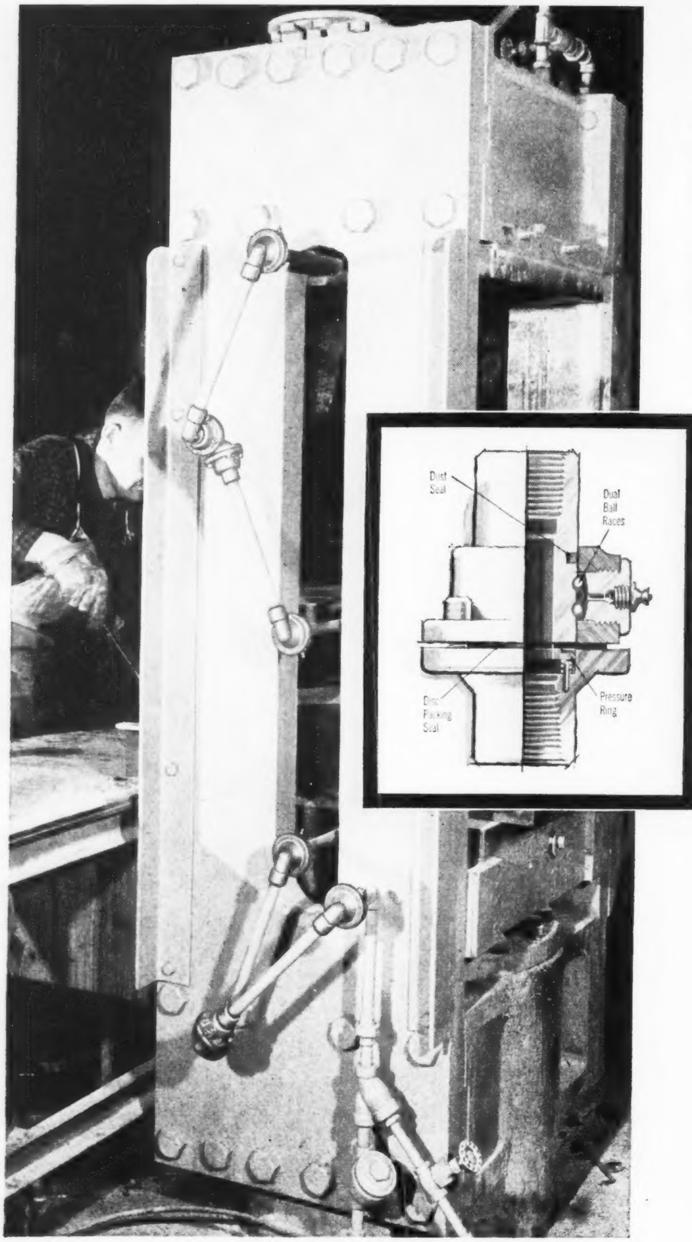
NOW–
CHIKSAN DISCPAK
SWIVEL JOINTS

INSURE SAFE, LASTING FLEXIBILITY FOR HOT GAS AND STEAM SERVICE LINES . . .



Typical of its diverse applications, the Discpak Swivel Joints, installed on the steam lines of the above platen press, provide predetermined travel arc, allow for packing replacement without removal from the line.

Replace packing with joint in the line–

Keeps line flexing in predetermined arc–

Free swiveling with extremely low torque–

Ideally suited on lines handling alternate steam and cold water flow–

Unlimited service life with minimum maintenance–

Chiksan Discpak Swivel Joints eliminate hose replacement costs, provide controlled line flexibility and end hose rupture hazards. A low cost seal is easily inserted *without* removing joint from the line. Savings in downtime and replacement costs quickly repay cost of installation. Don't delay, send for literature and name of your nearest Chiksan field engineer today.

Send for this informative Bulletin DP100. Contains detailed cutaway and dimensions of the complete Discpak line. →

A SUBSIDIARY OF FOOD MACHINERY AND CHEMICAL CORPORATION fmc **CHIKSAN**®

CHIKSAN COMPANY–BREA, CALIFORNIA • CHICAGO 5, ILLINOIS • NEWARK 2, NEW JERSEY

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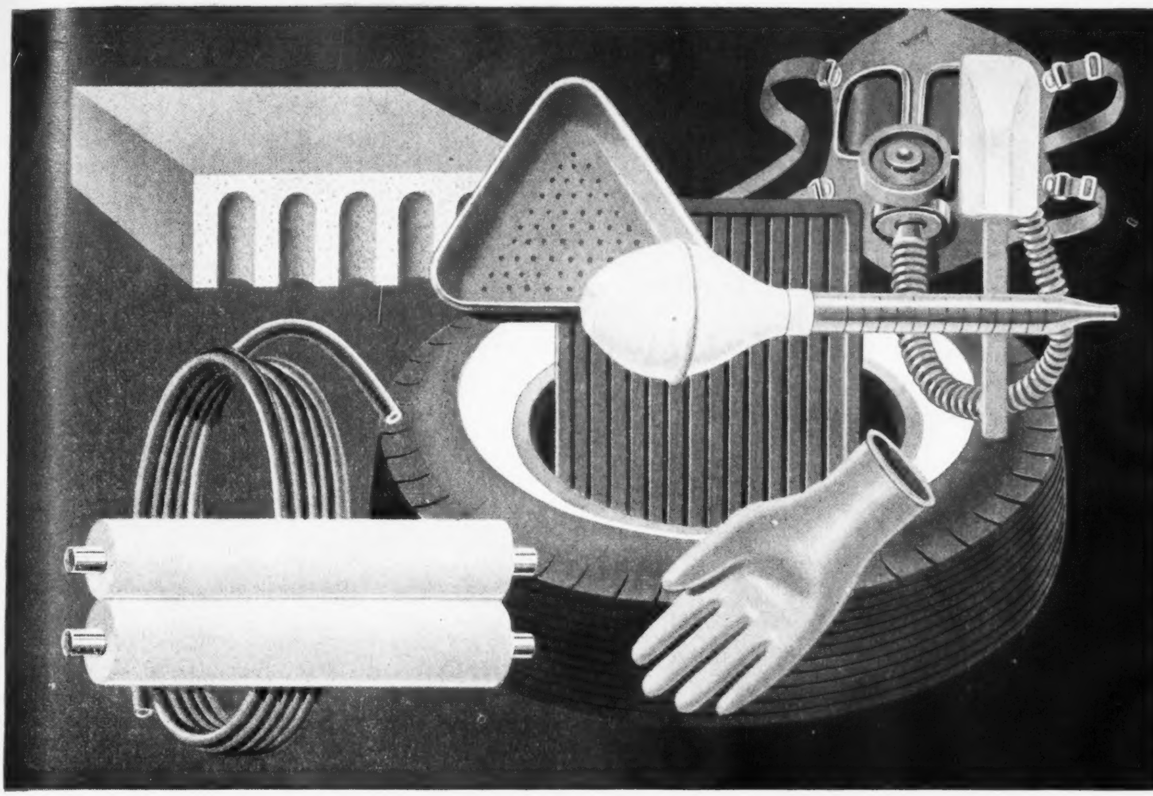

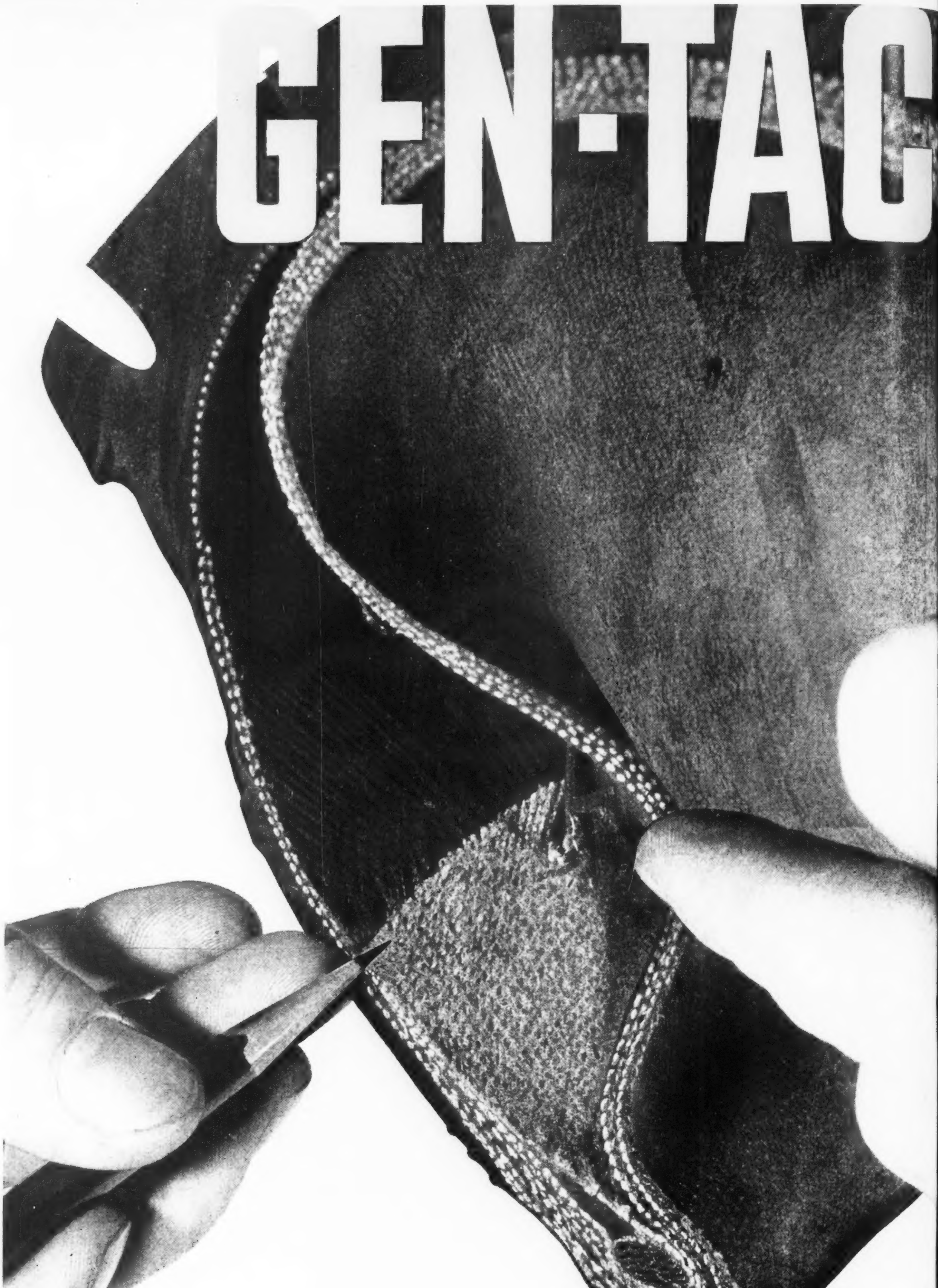
GEN-TAC

Test sheet being cut from rolls for shrinkage test that proves advantages of using Ameripol 1009.

YOU CAN REDUCE SHRINKAGE WITH AMERIPOL 1009

Give your compound better appearance, smoother surface, dimensional stability, reduced shrinkage with Ameripol 1009

You can obtain important special processing advantages with a minimum reduction in physical properties. Used up to 15% in conjunction with other synthetic rubbers and natural rubber, Ameripol 1009 will reduce shrinkage and swell during and after processing. Its use also promotes smoother calendered and extruded stocks and gives good dimensional stability.

The use of non-staining, non-discoloring antioxidant makes Ameripol 1009 applicable for both dark and light colored goods. It is presently being used as a processing aid in a wide variety of molded, extruded, and calendered goods.

For more information on how Ameripol 1009 can give you important processing benefits, write Goodrich-Gulf Chemicals, Inc., 3121 Euclid Avenue, Cleveland 15, Ohio.

Ameripol

THE PREFERRED RUBBER

Goodrich-Gulf Chemicals, Inc.

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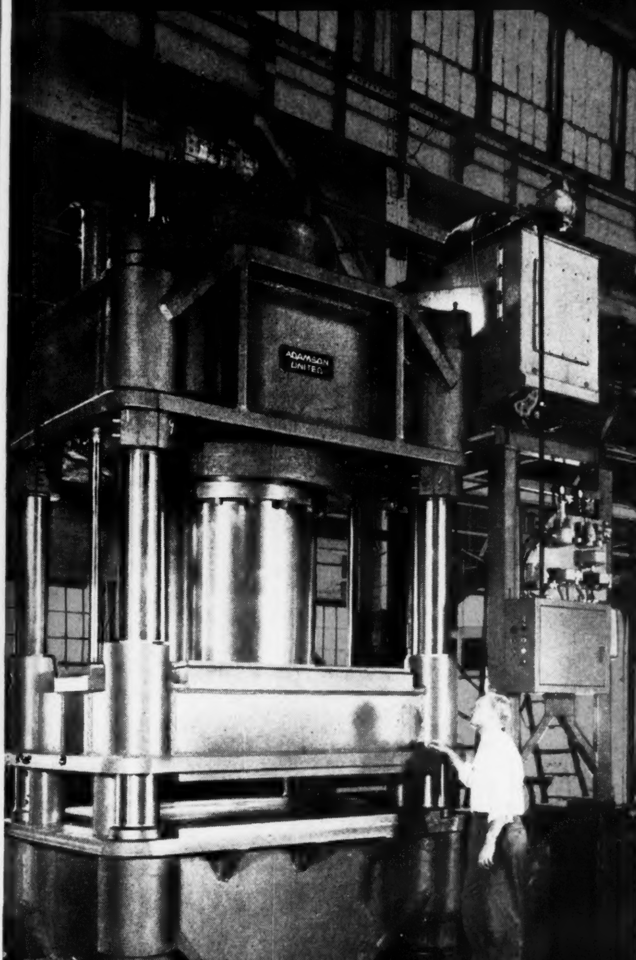
in less than 6 months



ANOTHER EXAMPLE OF THE ABILITY AND VERSATILITY OF ADAMSON ENGINEERING AND PRODUCTION

Our customer's requirements necessitated an entirely new design of hydraulic press. Starting from scratch, Adamson engineered, built and tested for service, this 1450 ton unit within a period of 6 months.

We have hundreds of standard press designs available, but when something *special* is required, we go "all out" to meet your needs. Every piece of new equipment is thoroughly tested on our erection floor in the customer's presence; and we supply competent technical assistance for first run operations if requested.

Why not talk over your press requirements with us . . . any time . . . without obligation?

Platen Size	76" x 76"
Total Hydraulic Pressure	1450 Tons
Stroke	40"
Daylight	50"
Ram Diameter	40"
Pull-Back Cylinders (2)	6"
Variable Volume Pump	
Compensator Control	

Adamson United Company

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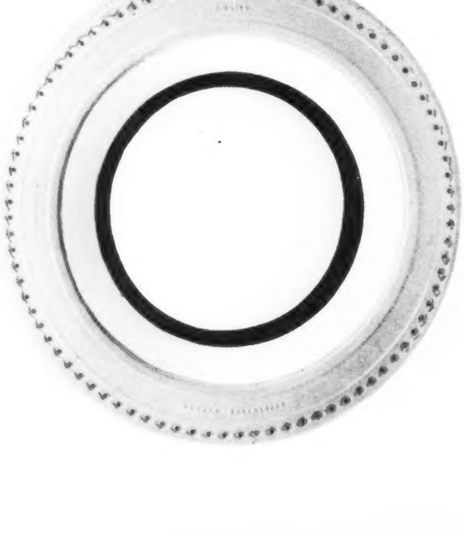

NEW COLOR INTO TIRES

for the asking. Just address Room 1929 at One Gateway Center.

Because Hi-Sil has very low covering power in rubber, the true deep tones . . . the vivid brights . . . the subtle pastels you see here are only a few of the unlimited color choices available to match or contrast with *any* background.

Doesn't the demonstrated performance of Hi-Sil 233 in critical applications like this suggest it as the answer to your quality colored goods problems?

The Columbia-Southern Chemical Corporation, One Gateway Center, Pittsburgh 22, Pa. Offices in principal cities. In Canada: Standard Chemical Limited.

CHEMICAL CORPORATION

A Subsidiary of Pittsburgh Plate Glass Company

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UNITED *Service-Proved* CRACKER ROLLS

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When you specify UNITED ROLLS, your complete satisfaction is guaranteed by over 50 years' experience in the design and manufacture of rolls for practically every type of rolling application. Precision engineered to the specific requirement of the individual machine or equipment in which they are to be used, UNITED *Service-Proved* ROLLS are in use the world over by processors of rubber, plastics, linoleum, paper, paint and scores of other metallic and non-metallic substances.

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- **TILE**
- **PAINT**
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NON-METALLIC *PROCESSING REQUIREMENT*

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SUBSIDIARIES: Adamson United Company, Akron, Ohio
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Designers and Builders of Ferrous and Nonferrous Rolling Mills, Mill Rolls, Auxiliary Mill and Processing Equipment, Presses and other heavy machinery. Manufacturers of Iron, Nodular Iron and Steel Castings and Weldments.

AMOCO CHEMICALS—A NEW RESOURCE

PANAFLEX BN-1 Plasticizer—possibly your answer to lower-cost plastisol and extrusion formulations

PANAFLEX BN-1 has demonstrated excellent capabilities as a viscosity stabilizer for vinyl plastisols in storage. In large-volume applications of both plastisols and extrusion compounds, PANAFLEX BN-1, as an extender plasticizer, may help you make important savings by giving you an equal-quality finished product at a lower cost per pound of compound.

PANAFLEX BN-1 is a clear, light straw-colored liquid. It has efficient plasticizing properties, is easy to process. It possesses first-rate electrical properties and has good moisture resistance. It is nonmigratory, and it will not support fungi.

Like more facts about PANAFLEX BN-1 Plasticizer? Your request for further information will receive an immediate reply.

AMOCO CHEMICALS

AMOCO CHEMICALS CORPORATION
910 South Michigan Ave., Chicago 80, Illinois

NEW MECHANICALLY MIXED* ULTRA-DISPERSED SYNPOL BLACK MASTERBATCHES

Commercially Proved **Commercially Available**

SYNPOL 8150—contains 50 parts of high-abrasion furnace black (HAF) ultra-dispersed in 100 parts of a cold butadiene-styrene copolymer rubber similar to SYNPOL 1500. It is prepared with a rosin acid soap emulsifier and contains a staining stabilizer.

SYNPOL 8250—contains 50 parts of high-abrasion furnace black (HAF) ultra-dispersed in 100 parts of a cold butadiene-styrene copolymer rubber extended with 25 parts of highly aromatic oil. It is prepared with a 50/50 mixed rosin and fatty acid soap emulsifier and contains a staining stabilizer.

SYNPOL 8251—contains 75 parts of high-abrasion furnace black (HAF) which is ultra-dispersed in 100 parts of a cold butadiene-styrene copolymer rubber extended with 37.5 parts of highly aromatic oil. It is prepared with a rosin acid soap emulsifier and contains a staining stabilizer.

*In each of these compounds, the carbon black is incorporated into the polymer latex by a new, highly efficient, mechanical dispersion technique.**

These commercially proved rubbers which have demonstrated significant improvements in tread wear and resistance to cracking have been designed for use in tire production and as tire retread rubbers.

The elimination of dispersing agents and coagulating salts yields a low ash content equivalent to that found in specially processed premium rubbers. The resultant low water absorption and good electrical insulating properties coupled with the economy of these polymers ideally suit them for use in soles and heels, molded mechanical and sporting goods, industrial rolls and wire coatings. Additional cost-savings may be effected by use of the oil-extended Black SYNPOLS, grades 8250 and 8251.

Cleanliness, and mixing economies experienced with these masterbatches through lower power consumption and shorter mix cycles, together with the uniformity assured from a fully proved production process, will enable rubber processors to increase the productivity of their equipment as well as reduce over-all inventories for carbon black and rubber.

***Commercial Process Developed by Texas-U. S. Chemical Company Based on Columbian Method.**

Black SYNPOL 8150

Description and Specifications

DESCRIPTION

Stabilizer	Staining
Emulsifier	Rosin Acid Soap
Coagulant	Acid
Carbon Black	50 pts. HAF/ 100 pts. Polymer

CHEMICAL	MIN.	MAX.
Volatile Matter, % wt.		1.00
Ash, % wt.		0.50
Organic Acid, % wt.	3.25	4.75
Soap, % wt.		0.50
Carbon Black (HAF), % wt.	32.4	34.2

PHYSICALS	MIN.	MAX.
Compounded Viscosity, ML-4 @ 212°F	65	80
Vulcanizate Properties (Cure @ 292°F)		
Tensile Strength, psi @ 50-min. cure	3000	
Elongation, % @ 50-min. cure	350	
Modulus, psi @ 300% elong.		
@ 25-min. cure	1325	2125
50-min. cure	1750	2650
100-min. cure	2100	3100

Black SYNPOL 8250

Description and Specifications

DESCRIPTION

Stabilizer	Staining
Emulsifier	Mixed Acids Soap
Coagulant	Acid
Oil	25 pts. Highly Aromatic/ 100 pts. Polymer
Carbon Black	50 pts. HAF/ 100 pts. Polymer

CHEMICAL	MIN.	MAX.
Volatile Matter, % wt.		1.00
Ash, % wt.		0.50
Organic Acid, % wt.	3.20	4.50
Soap, % wt.		0.40
Carbon Black (HAF), % wt.	27.2	29.9

Typical Production Range

PHYSICALS	MIN.	MAX.
Compounded Viscosity, ML-4 @ 212°F	55	70
Vulcanizate Properties (Cure @ 292°F)		
Tensile Strength, psi @ 50-min. cure	2900	
Elongation, % @ 50-min. cure	500	
Modulus, psi @ 300% elong.		
@ 25-min. cure	300	900
50-min. cure	650	1350
100-min. cure	900	1600

Black SYNPOL 8251

Description and Typical Production Values

DESCRIPTION

Stabilizer	Staining
Emulsifier	Rosin Acid Soap
Coagulant	Acid
Oil	37.5 pts. Highly Aromatic/ 100 pts. Polymer
Carbon Black	75 pts. HAF/ 100 pts. Polymer

CHEMICAL	MIN.	MAX.
Volatile Matter, % wt.		1.00
Ash, % wt.		0.50
Carbon Black (HAF), % wt.	33.9	36.6

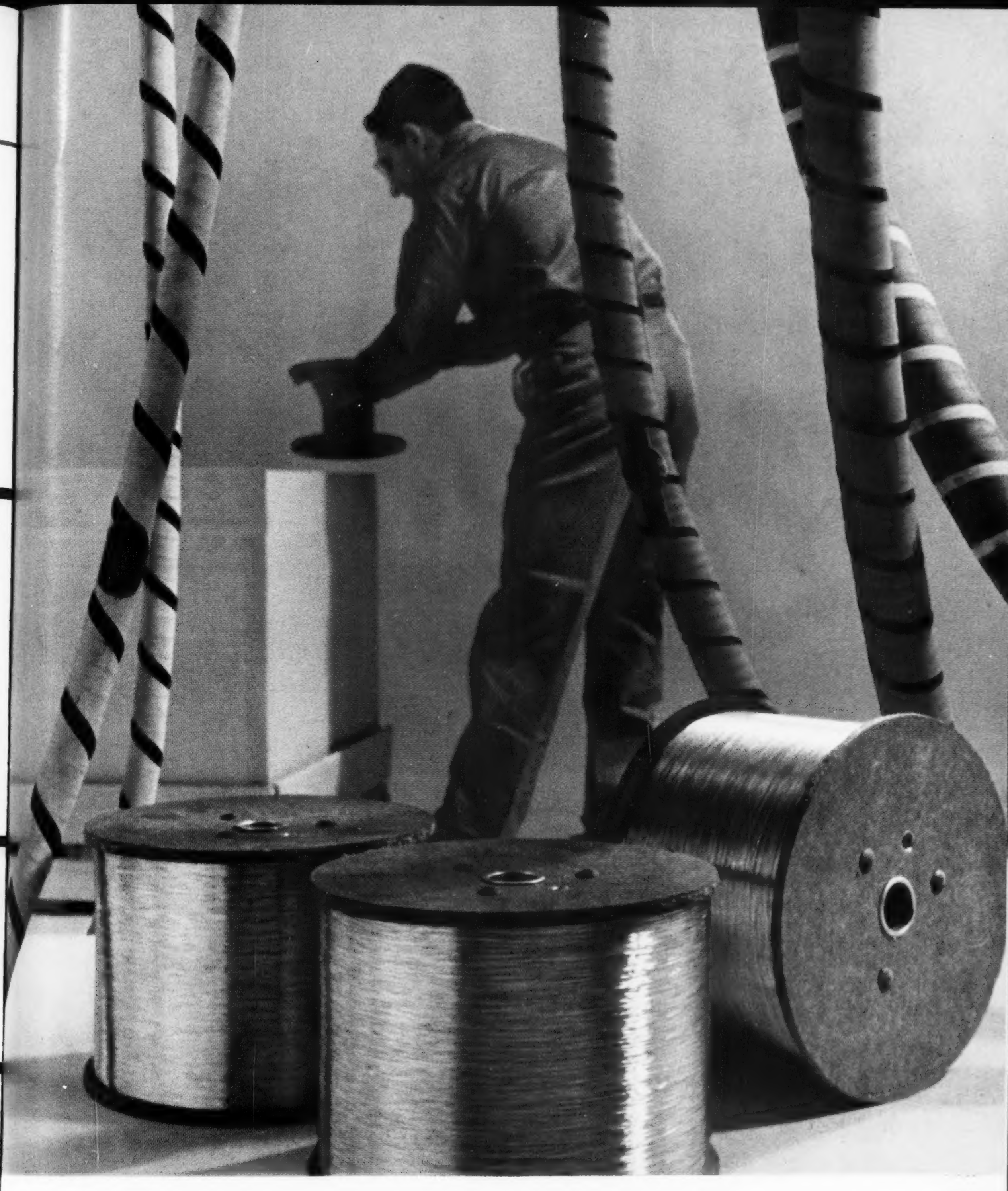
TEST RECIPES

The physical and chemical properties outlined above were determined on test compounds prepared according to the following recipes. The compounds were cured at 292°F for the various time periods noted above and tested at 77°F. Detailed procedures used in compounding and milling the test stocks are available upon request.

SYNPOL GRADES TESTED	8150	8250	8251
Recipe*			
Copolymer	150.0	140.0	154.5
Zinc Oxide	5.0	1.5	1.5
Sulfur	2.0	2.0	2.0
Benzothiazyldisulfide	2.0	1.0	1.0
Stearic Acid	1.5		1.5
TOTALS	160.5	144.5	160.5

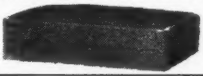
*The figures given are parts by weight of NBS Standard Compounding Ingredients.

TEXAS-U. S. CHEMICAL COMPANY



ZnO-105 Plant & Laboratory: Monaca (Josephtown), Pennsylvania

*Philprene** rubber for low water absorption!

CURRENT PHILPRENE POLYMERS		
	NON-PIGMENTED	PIGMENTED WITH PHILBLACK*
		
HOT	PHILPRENE 1000 PHILPRENE 1001 PHILPRENE 1006 PHILPRENE 1009 PHILPRENE 1010 PHILPRENE 1018 PHILPRENE 1019	PHILPRENE 1100 * * PHILPRENE 1104 * * (Pigmented with EPC Black)
COLD	PHILPRENE 1500 PHILPRENE 1502 PHILPRENE 1503	PHILPRENE 1601 PHILPRENE 1605
COLD OIL	PHILPRENE 1703 PHILPRENE 1706 PHILPRENE 1708 PHILPRENE 1712	PHILPRENE 1803 PHILPRENE 1805

Let it rain, let it pour! Water is no problem with Philprene 1018 on the job. Low water absorption is its specialty. Used with other polymers, Philprene 1018 provides protection against water . . . for wire and cable jackets, rubber footwear, storm coats and other rubber articles.

Phillips Chemical Company makes the largest variety of commercially available polymers on the market. You can select one that is practically made to your own specifications! Consult your Phillips technical representative for complete information.

*A trademark

PHILLIPS CHEMICAL COMPANY

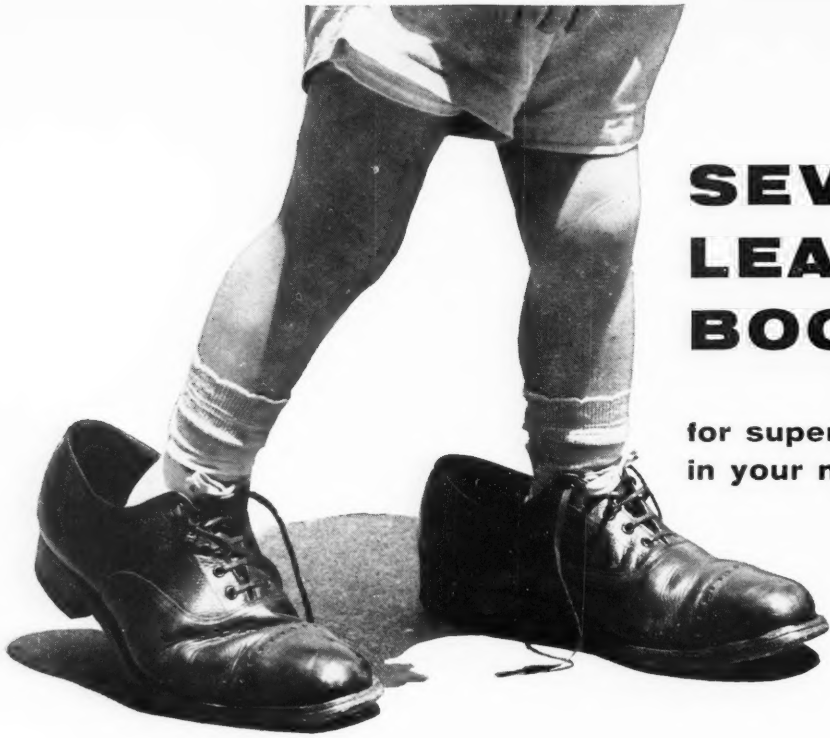
Rubber Chemicals Division • 318 Water St., Akron 8, Ohio

District Offices: Chicago, Providence and Trenton

West Coast: Harwick Standard Chemical Company, Los Angeles, Calif.
Warehouse stocks at above points and Toronto, Canada

Export Sales: 80 Broadway, New York 5, N. Y.

European Sales Office: Phillips Chemical Company, Limmatquai 70, Zurich 1, Switzerland



ESPESOL 165's Narrow boiling range reduces handling time—improves quality of end product!

NEW ESPESOL 165 aliphatic solvent offers rubber processors a *narrow boiling range of 165 to 225 degrees F* with a low-odor factor. This narrow cut with its low end point offers a much shorter drying time and a substantial increase in production. ESPESOL 165's higher initial boiling point offers less evaporation loss and permits greater solvent recovery. The solvent's unusually short distillation range offers two additional benefits: 1. Improved quality of end products. 2. Reduction in amount of solvent used.

Because the use of ESPESOL 165 can reduce handling time, increase production and improve the quality of your end products, this outstanding new solvent deserves the consideration of your organization. Send for the complete ESPESOL 165 story. Brochure containing characteristics and properties yours free on request. (No delivery problems! Eastern maintains adequate stocks of this unique product at all times.)

EASTERN STATES PETROLEUM & CHEMICAL
Corporation

(Formerly Eastern States Chemical Corporation)
P. O. Box 5008 • Houston 12, Texas • Phone WAlnut 3-1651
Chicago Office: 1011 Lake Street, Oak Park, Ill., Phone Village 8-5410
New York Office: 10 Rockefeller Plaza, New York, N.Y., Phone Circle 7-2520
Cleveland Office: 20800 Center Ridge Road, Cleveland, O., Phone Edison 3-0188

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Please send me free booklet on the characteristics and properties of Espesol 165.

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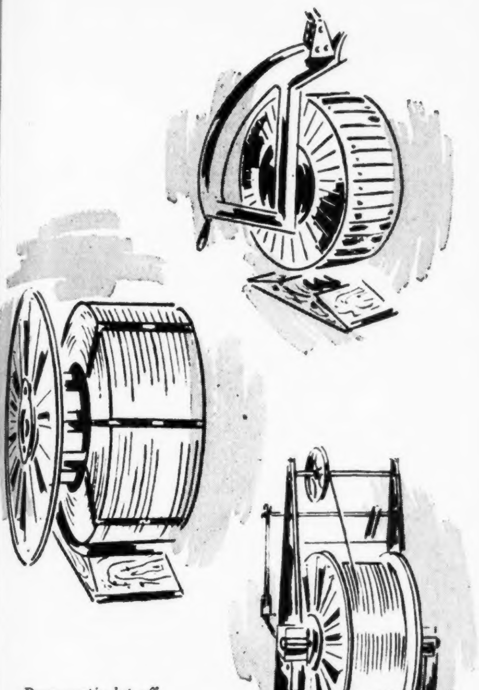
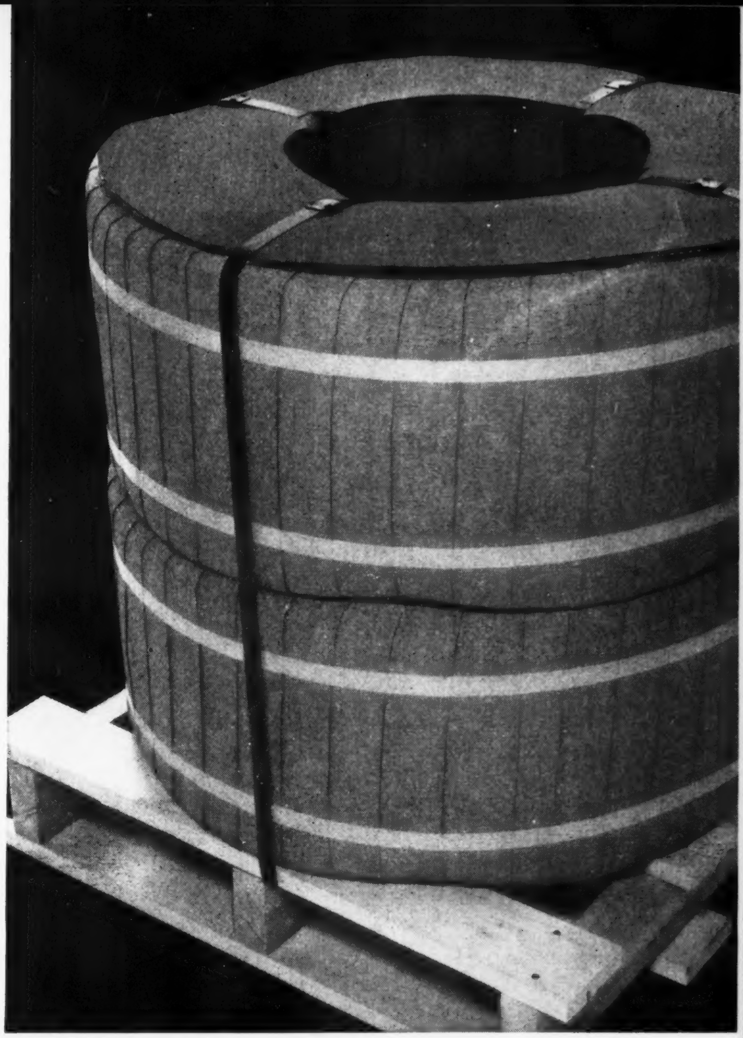


Pneumatic let-off reels are quickly, easily applied to coils at point of use. Drawings show pneumatic lifter positioning coil over saddle block, partially assembled reel and completely assembled reel feeding wire from conventional let-off stand.



NEAT WAY TO CUT TIRE AND HOSE COSTS

You gain *many* advantages with National-Standard reelless, palletized wire coils. They add up to improved tire bead and hose production at lower cost! For example . . .

Shipping advantages. Freight tare for incoming wire is cut to a fraction. And, no empty reels whatever to store, handle or return!

Handling advantages. Unloading and movement in or out of storage takes only *half* the usual time and effort! Safe, easy stacking multiplies storage capacity and permits accessibility ideal for inventory rotation.

Production advantages. Unmatched wire protection during shipment, storage and handling due to *complete wrapping*. Secondly, longer coil lengths, up to 1000 lbs., minimize change-overs. Finally, N-S pneumatic let-off reels assure uniform flange pressure throughout the pay-off, eliminating tangling, breaking and down-time.

Find out what this National-Standard development and its improved methods can mean in your particular operations. Write for complete information.

NATIONAL STANDARD

DIVISIONS: NATIONAL-STANDARD, Niles, Mich.; *tire wire, stainless, music spring and plated wires*
WORCESTER WIRE WORKS, Worcester, Mass.; *music spring, stainless and plated wires, high and low carbon specialties* • REYNOLDS WIRE, Dixon, Ill.; *industrial wire cloth*
WAGNER LITHO MACHINERY, Secaucus, N. J.; *metal decorating equipment* • ATHENIA STEEL, Clifton, N. J.; *flat, high carbon spring steels*

RUBBER WORLD
EDITORIAL

Rubber Progress Week in 1959?

The Rubber Manufacturers Association, Inc., has published and begun distribution of a new two-color, 16-page booklet entitled, "What Is the Rubber Industry?" This booklet represents a joint editorial effort of the RMA economic, industrial relations, and public relations committees over the past several months. Its purpose is to broaden public understanding of the rubber industry as one of the nation's impressive growth industries and to relate the industry's important contributions to both civilian economy and the national security.

The preparation of this booklet was undertaken by the RMA following the presentation, "Rubber Industry Performance," by an industry economic committee at the Association's annual meeting in November, 1957, and the suggestion of John L. Collyer, chairman of The B. F. Goodrich Co. and a director of the RMA, that an objective for rubber industry companies in 1958 should be improved communications with the public, its employes, customers, and shareholders.

This very commendable effort of the RMA to educate the public to the facts that the rubber industry consists of 1,493 companies with 1,834 plants, employing 265,000 persons, in 752 cities, making 40,000 products, together with much other pertinent information about industry economics through 1957, is an excellent beginning for the stepped-up public relations program of the RMA. It should be developed further along the lines also suggested by Mr. Collyer last November, however, by designation by the RMA of one week each year as "Rubber Progress Week," in the same manner as the chemical industry has its "Chemical Progress Week," and the oil industry its "Oil Progress Week."

The year 1959 is particularly well suited for instituting Rubber Progress Week as an annual event since there will be an International Rubber Conference in Washington, D. C., November 8-13. This Conference, which is being sponsored by the Rubber Divisions and/or Committees of the American Chemical Society, the American Society for Testing Materials, and the American Society of Mechanical Engineers, will provide information on the latest developments in science and engineering in the rubber field. Information on products and their development and uses, industry economics, and how the industry and its products are involved in the daily lives of almost everyone in this country could be provided by the RMA and the rubber companies. Selected portions of this material should then be disseminated by national television, radio, magazines and newspapers, and on the local level as well.

Relations between the rubber industry, its customers, employes, shareholders, and the public in general should reach a new high in understanding if an annual Rubber Progress Week could be instituted in 1959. It is believed that such a project would be of mutual benefit to all concerned.

Distribution of the new RMA booklet should lay the groundwork for an annual Rubber Progress Week, a very necessary further development for continued industry growth under present-day conditions, when public acceptance of an industry and its products is so important to such growth.

The RMA and the industry are urged to give early consideration to the formation of a Rubber Progress Week Committee. It is suggested that representation on this committee from the International Conference Committee be arranged for.

R. G. Seaman

EDITOR

RUBBER WORLD

Halogenation of Butyl Rubber with Iodine Monochloride and Iodine Monobromide[1]

By R. T. MORRISSEY
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BUTYL rubber (ASTM Designation IIR)[2] has many desirable properties which have extended its use in recent years to a wide variety of commercial products. For some products, however, the usefulness of IIR has been limited because of its incompatibility of cure with other elastomers and its poor adhesive properties. These two shortcomings have been largely corrected by brominating the polymer.[3] The beneficial effects produced by bromination encouraged an investigation of the reactions of other halogens with butyl rubber.

But of all the halogens, bromine still appeared to be the most effective in producing an improved butyl-type polymer. Fluorine seemed to be too reactive. In its reaction with butyl rubber, fluorine apparently breaks the polymer chains and reduces the molecular weight of the polymer. The result is that the fluorinated butyl rubbers have shown low tensile strengths.

Chlorine also causes some degradation of butyl.[4] In the lower concentrations however, it has produced modifications which have partially approached those obtained with bromine.

In contrast to fluorine and chlorine, iodine reacts very slowly with butyl. Polymers prepared with an excess of iodine plus a catalyst still contained only a small amount of combined halogen. As would be expected, these slightly iodinated polymers showed no improvement over butyl rubber in regard to cure compatibility with natural rubber and adhesion properties.

As a part of this investigation of the halogenation of IIR, attention was directed toward the halogen halides as possible substitutes for bromine and the other elemental halogens. Preliminary trials with iodine monochloride indicated that it produced modifications of IIR similar to those obtained with bromine. These

[1] Presented before the Division of Rubber Chemistry, ACS, New York, N. Y., Sept. 11-13, 1957.
[2] American Society for Testing Materials D 1418-56T, Philadelphia, Pa.
[3] R. T. Morrissey, *Ind. Eng. Chem.*, 47, 1562 (1955).
[4] R. T. Morrissey, M. R. Frederick, United States patent No. 2,732,354 (1956).

The Author

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He is a member of the American Chemical Society and its Division of Rubber Chemistry.

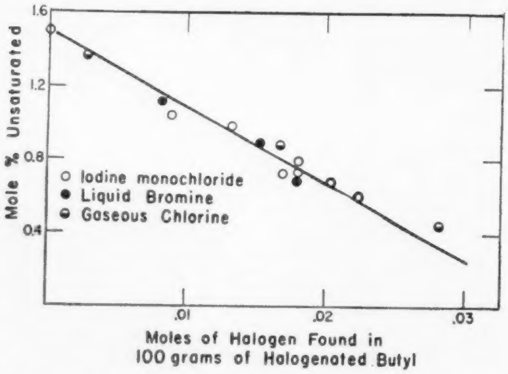


Fig. 1. Halogen content *vs.* mole % unsaturation of halogenated butyl

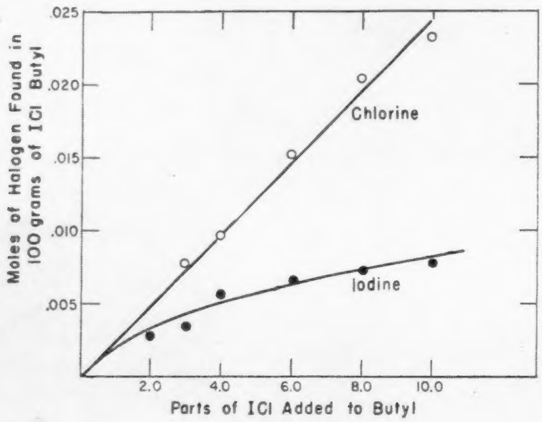


Fig. 2. Amount of ICl charge vs. halogen content of ICl butyl

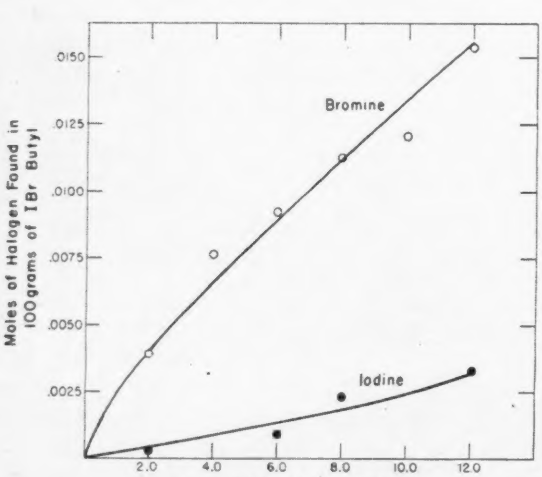


Fig. 3. Amount of IBr charge *vs.* halogen content of IBr butyl

Fig. 6. *(at right)*. Halogen content of IBr butyl and brominated butyl *vs.* tensile strength of 70/30 blends with natural rubber

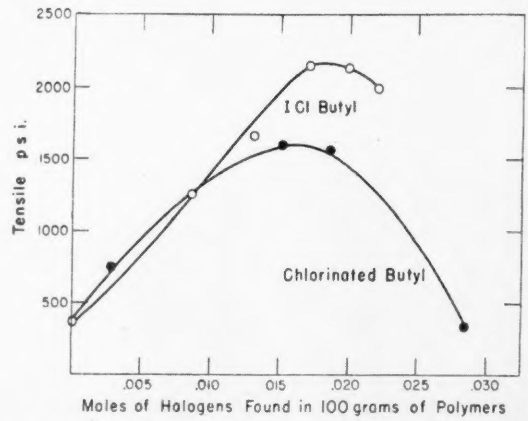


Fig. 4. Halogen content of ICl butyl and chlorinated butyl *vs.* tensile strength of 70/30 blends with natural rubber

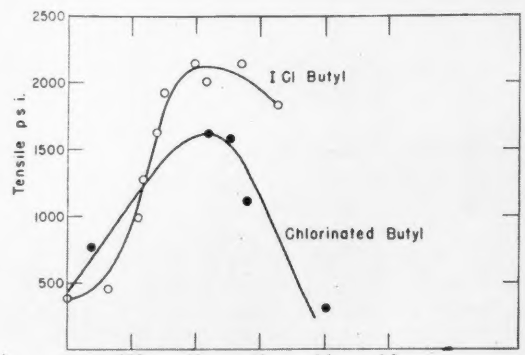
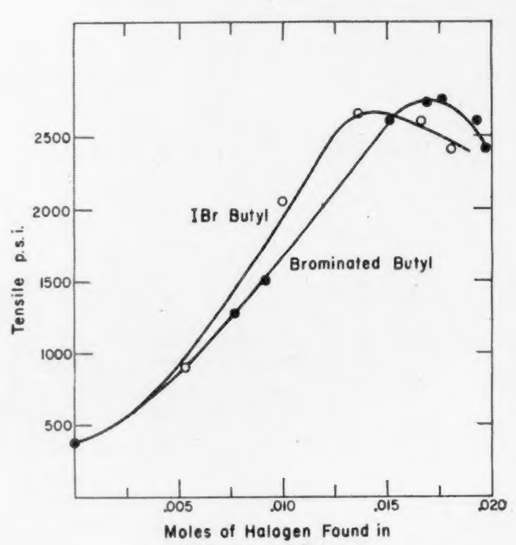


Fig. 5. Chlorine content of ICl butyl and chlorinated butyl *vs.* tensile strength of 70/30 blends with natural rubber



Halogenation of Butyl Rubber

Two long-standing defects of butyl rubber (IIR) are its incompatibility of cure with other elastomers and its poor adhesive properties.

Much effort has been expended in recent years to improve this situation through chemical modification of the existing polymer. A favored line of attack has been the halogenation of butyl.

Fluorine, as might be expected, breaks the polymer chains and reduces molecular weight. Chlorine has a similar action except for low degrees of chlorination. Bromination of butyl rubber, on the other hand, has produced an improved butyl-type polymer.

This discovery has resulted in increased interest in halogenation processes and in the successful use of halogen halides as substitutes for bromine and the other elemental halogens.

Combinations of chlorine or bromine in the form of iodine monochloride and iodine monobromide serve to modify butyl rubber in much the same manner as bromine alone. The ICl and IBr butyls show, as in the case of brominated butyl, several properties superior to those of butyl; among which are better covulcanization with natural rubber, greater resistance to ozone, and increased adhesion to natural rubber and metals.

Studies of the reaction of halogen halides with butyl rubber indicate that only a portion of the iodine remains in the halogenated polymer; hydroiodic acid is believed to split out, leaving the chlorine or bromine still in the polymer.

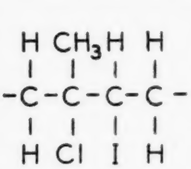
During vulcanization the small amount of iodine remaining in the polymer probably enters into a metal oxide cure and thus accounts for the better cure compatibility with natural rubber and for improved adhesion.

results were considered most important in view of the fact that chlorine has been only mediocre, and iodine very poor as compared to bromine in producing improvement in the compatibility of cure and adhesive properties of butyl rubber.

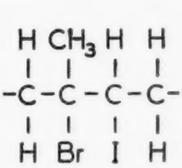
It was therefore decided to study critically the reactions of halogen halides on butyl from both the theoretical and practical points of view. The present work has been limited to the effects of iodine monochloride and iodine monobromide. The halogenated butyls produced by these halogen halides will be designated respectively as ICl butyl and IBr butyl.

Theory or Reaction

The reaction of bromine with butyl rubber has been considered mainly as addition to the double bonds of the isoprene units contained in the polymer. This theory has been confirmed by the fact that the % unsaturation decreases as a linear function of the amount of bromine present in the polymer. Likewise gaseous chlorine, iodine monochloride, and iodine monobromide decrease the unsaturation of butyl rubber in an identical manner to that of bromine (Figure 1). In the reaction of iodine monochloride or iodine monobromide with butyl rubber, the iodine and chlorine or bromine are believed to attach themselves to adjacent carbon atoms of some of the isoprene units so as to form the following structures:

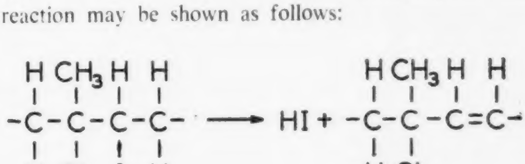


AND



The chlorine and bromine from iodine monochloride and iodine monobromide react almost as a linear function of the amount of each halogenating agent added to IIR (Figures 2 and 3). Owing to the higher molecular weight of the iodine monobromide, the amount of bromine in the IBr polymers was always lower than that of the combined chlorine in the ICl polymers for the same concentration of the halogenating agent. The halogen analysis of the polymers has also indicated that the amount of iodine remaining in the polymer is much less than that of the chlorine or bromine.

The difference is most pronounced in the case of the bromine and iodine from iodine monobromide (Figure 3). It is believed that in the initial reaction the halogens from iodine monochloride or iodine monobromide react with IIR in equal molar amounts. A portion of the iodine may then split out as hydroiodic acid. This point is in agreement with the theory proposed by Buckwalter and Wagner[5] as a result of their work with iodine monochloride in the determination of ethyllenic unsaturation, and the work of Lee, Kolthoff, and Mause in determining the unsaturation of rubber.[6] In the case of the iodine monochloride the reaction may be shown as follows:



In both cases the iodine probably splits out easily because of the weakness of the iodine-carbon bond.

[5] *J. Am. Chem. Soc.*, 52, 5241 (1930).
[6] *J. Polymer Sci.*, 3, 66 (1948).

The tendency for the iodine to split out is still greater in the case of the IBr polymers because of the steric hindrance to the iodine atom from the relatively large bromine atoms on adjacent carbons of the butyl chain.

The reaction of ICl and IBr with IIR is extremely rapid. The actual time probably occupies only a few seconds. In order to study the effect of reaction time, several polymers were prepared with the same concentrations of iodine monochloride and butyl rubber. The reactions were allowed to proceed for various times (one minute to 10 minutes). At the end of each interval the reaction was terminated by the addition of caustic.

The determination of combined halogen in each of the polymers showed that the chlorine remained constant, whereas the iodine content was lowered by extending the reaction time (Table 1). Thus the data substantiate the theory that the iodine originally combines with the polymer and then splits out. Despite this loss of iodine from the polymer, and the possibility of a new double bond being created, the mole % unsaturation of the polymer remains the same (Table 1). It may therefore be assumed that the new double bond created by the splitting out of the iodine does not react further with halogen. The deactivation of the newly formed double bond may be due to the combined effect of steric hindrance and polarization produced by the methyl and chlorine groups in the alpha positions.

TABLE 1. EFFECT OF REACTION TIME ON THE IODINE CONTENT OF THE ICL BUTYL

Reaction Time in Minutes	% Halogen in Polymer I	% Halogen in Polymer Cl	Mole % Unsaturated
1	2.0	1.23	0.67
2	1.95	1.24	0.59
5	1.43	1.27	0.61
10	0.85	1.23	

Further evidence of the inhibitory effect of chlorine close to a double bond is offered by polychloroprene (neoprene). In unsaturation determinations of this polymer, the bromine or iodine monochloride reacts very slowly, and the unsaturation values show wide variation.

Stress-Strain Characteristics of Blends

It is well known that IIR develops a sponginess of cure in the presence of even small amounts (1-5%) of highly unsaturated rubbers such as natural rubber. The highly unsaturated rubbers, it is thought, consume nearly all the sulfur-type curing ingredients and thus leave little or nothing for the butyl, which then acts merely as a softener. One of the principal effects of the halogenation of IIR has been the improvement in cure compatibility of the polymer with these more unsaturated rubbers.[3] The halogenation of IIR makes possible a different cure mechanism involving the halogen and a bivalent metal oxide. In the halogenation process approximately half of the double bonds present in the isoprene units of butyl rubber becomes saturated with the halogen, and the remaining double bonds are still available for vulcanization by means of sulfur. It is felt that the vulcanization of the halogenated butyl in blends with natural rubber or SBR is largely through the metal oxide.

A reversal of these same conditions exists in blends of butyl with neoprene.[7] In this case the high unsaturation of the neoprene does not interfere with the sulfur cure of IIR because neoprene requires a metal oxide cure.

The most critical range of natural rubber concentrations in the blends with butyl has been 10 to 40 parts. A 70/30 mixture of halogenated polymer with natural rubber has been used to elevate the ICl and IBr polymers. Table 2 shows the range of cure compatibility with natural rubber which can be expected by adding various amounts of iodine monochloride or iodine monobromide to butyl rubber. In each case the best stress-strain properties for the 70/30 blend are reached at an optimum concentration of the halogenating agent.

TABLE 2. STRESS-STRAIN PROPERTIES OF ICL AND IBR BUTYL POLYMERS IN A 70/30 BLEND WITH NATURAL RUBBER

	ICl Butyl			IBr Butyl		
	Opt. Cure 30 Min. at 307° F.			Opt. Cure 20 Min. at 307° F.		
Halogenating Agent Added to 100 Grams of Butyl	300% M (Psi.)	T (Psi.)	E (%)	300% M (Psi.)	T (Psi.)	E (%)
2g	775	975	375	750	900	400
4g	1300	1575	375	675	850	360
6g	1250	2100	460	1225	1975	410
8g	1200	1825	410	1000	2600	525
10g	1075	1775	435	1925	2350	525

It has been interesting to compare the effects of iodine monochloride and chlorine on the cure compatibility of butyl. The tensile strength of the 70/30 blends with natural rubber has been used as the basis of comparison (Figure 4). The most noticeable difference is the higher tensile obtained in the blends containing the ICl polymers as compared with the chlorinated butyls. The optimum amounts of both iodine monochloride and chlorine required in the halogenated IIR for the best tensile strength of the blend appear to be very close together.

As the amount of either halogenating agent is increased beyond its optimum, a decrease occurs in the tensile of the polymer alone and in blends. This effect is especially true of the chlorinated IIR polymers, where the very reactive chlorine causes marked degradation of the butyl. The iodine monochloride can be considered less reactive than chlorine and apparently causes less degradation of the polymer.

[7] D. V. Sarbach, U. S. patent No. 2,611,758 (1952).

A further comparison of the iodine monochloride polymers and the chlorinated butyls purely on the basis of chlorine content has shown that the optimum properties in the blend were obtained at the same concentration of chlorine in the polymer (Figure 5). Thus it would seem that the chlorine content is very important in determining the properties of the iodine monochloride polymers. The better cure compatibility of the ICl butyl as compared to chlorinated polymer must be due, however, to the presence of the iodine. Some evidence for the importance of the iodine in the polymer has been offered by the comparison of the properties of the various ICl polymers prepared at different reaction times. As already mentioned, the lengthening of the reaction time of the iodine monochloride and butyl has resulted in polymers with lower iodine content. An evaluation of these polymers in the 70/30 blend with natural rubber has shown that the tensile strength of the mixture decreases as the iodine content of the polymer becomes lower (Table 3).

TABLE 3. EFFECT OF IODINE CONTENT OF ICL BUTYL ON THE STRESS-STRAIN PROPERTIES OF THE POLYMER IN A 70/30 BLEND WITH NATURAL RUBBER

% Halogen in Polymer		Stress-Strain (70/30 Blend)		
I	Cl	300% M (Psi.)	T (Psi.)	E (%)
2.0	1.23	1400	2175	425
1.95	1.24	1200	2125	485
1.43	1.27	1200	1850	410
0.85	1.23	1100	1675	410

The study of the iodine monobromide polymers in the 70/30 blend with natural rubber has revealed that a close relation exists between these polymers and those prepared with bromine. In Figure 6 the tensile strengths of the blends for both types of halogenated butyl have been compared on the basis of total moles of halogen in the polymer.

The optimum concentration of total halogen required in the polymer for the highest tensile of the blend was obtained within approximately the same range. Also, the optimum molar amounts of the halogens in the IBr and brominated butyl polymers are very similar to the most effective concentrations of halogens in the ICl and chlorinated polymers.

The advantages of bromination over chlorination of butyl have been observed once again in the iodine monobromide polymers when the latter have been compared to ICl butyl. One advantage is the higher tensile strength of the blends for the IBr polymers and natural rubber.

The function of the iodine in the IBr polymers has been difficult to determine mainly because a greater part of the superior properties can be contributed to the presence of bromine in the polymer. Some indication that the iodine may be contributing to the cure of these polymers in blends with natural rubber is shown in Figure 7. In this case, best tensile properties for the mixtures with natural rubber were obtained at a lower bromine content of the IBr polymer as compared to the optimum level for brominated butyl. Therefore it may be assumed that the iodine along with the bromine may be entering into the metal oxide cure of the halogenated butyl.

The relative merits of chlorine, iodine monochloride, and bromine as halogenating agents for butyl rubber are indicated by the tensile strength which can be expected from blends of these polymers in various proportions with natural rubber (Figure 8). In mixtures of unhalogenated butyl with natural rubber the tensile decreases almost linearly as the amount of butyl is increased up to a 90/10 ratio.

As indicated previously, the degree of improvement in cure compatibility of butyl produced by halogenation depends upon the type of halogen used. The bromination of butyl has produced a polymer which has given the least decrease in tensile of the various blends, and IBr butyl polymers have shown similar cure compatibility. The ICl polymers have revealed a definite advantage in tensile as compared to the chlorinated butyls. In the mixtures of ICl butyl with natural rubber, a unique minimum tensile appears to be reached in the 50/50 blend. The chlorinated IIR mixtures reach such a minimum with the 60/40 blend. The mixtures of brominated IIR have not shown such a minimum. Here the tensiles level off at the high ratios of the polymer.

An examination of the stress-strain properties of the IBr and ICl butyl polymers has indicated that the differences encountered are comparable to those existing between brominated and chlorinated butyl. The most noticeable difference occurred in modulus (Figure 9). As the amount of iodine and bromine from iodine monobromide was increased in butyl, the modulus of the cured polymer was raised. Over much of the same range the modulus of the ICl polymer decreased with increasing amounts of iodine and chlorine in the polymer. Corresponding to the increase in modulus of the IBr polymers there was a decrease in elongation (Figure 10). On the other hand the elongation of the ICl butyl appeared to be unaffected by increasing amounts of both of the halogens. The tensile strengths of the IBr butyl remained constant. The ICl polymers showed a slight drop in tensile mainly in the polymers containing the higher amounts of iodine and chlorine.

Ozone Resistance

The excellent ozone resistance of butyl rubber is one of its outstanding properties.[8] Unfortunately the blends of IIR with natural rubber or SBR have shown a low resistance to ozone attack.[9] Because of its better cure compatibility, brominated butyl has made possible a definite improvement in the ozone resistance of such blends. Mixtures of natural rubber with both the ICl and IBr butyl have also revealed a higher degree of

[8] C. D. Edwards, E. B. Storey, *Trans. Inst. Rubber Ind.*, 31, 45 (1955).
[9] R. F. Neu, *Rubber Age (N. Y.)*, 81, 287 (1957).

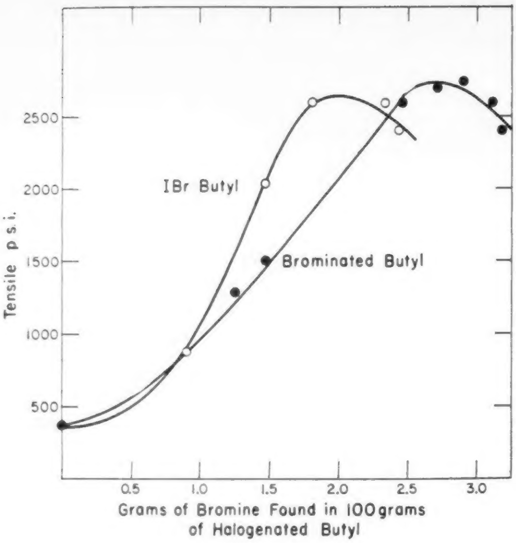


Fig. 7. Bromine content of IBr butyl and brominated butyl *vs.* tensile strength of 70/30 blends with natural rubber

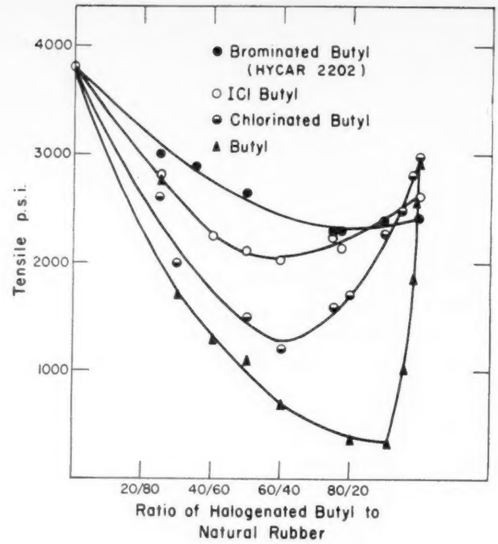


Fig. 8. Effect of various halogenated butyls on blends with natural rubber

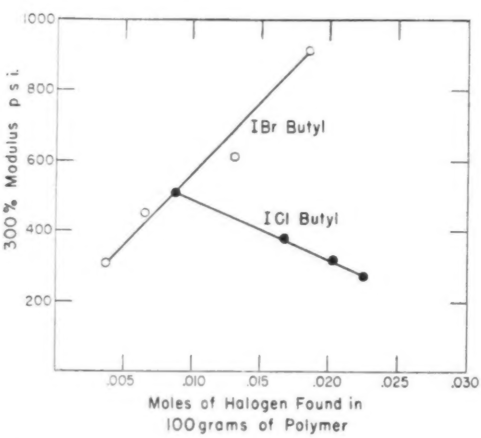


Fig. 9. Halogen content *vs.* 300% modulus of ICl and IBr butyl

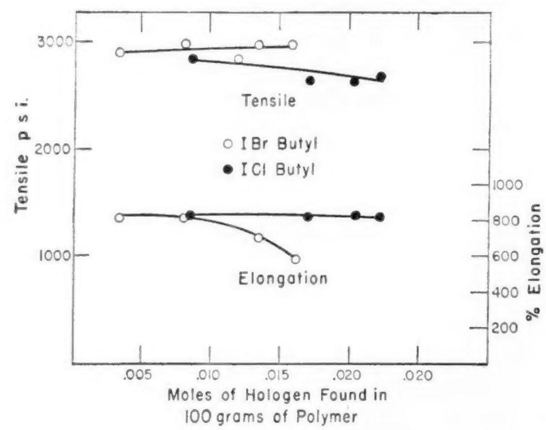


Fig. 10. Halogen content *vs.* tensile strength and % elongation of ICl and IBr butyl

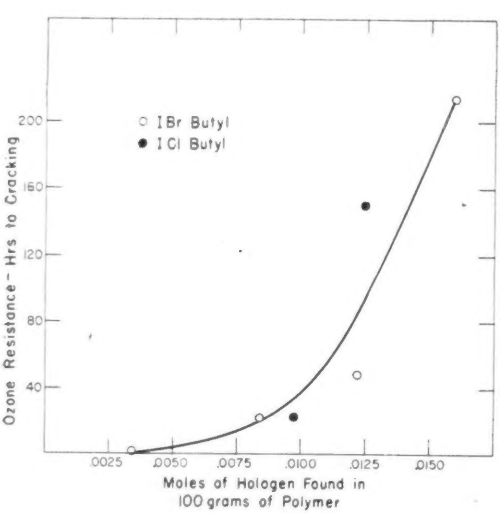


Fig. 11. Halogen content of ICl and IBr butyl *vs.* ozone resistance of 70/30 blends with natural rubber

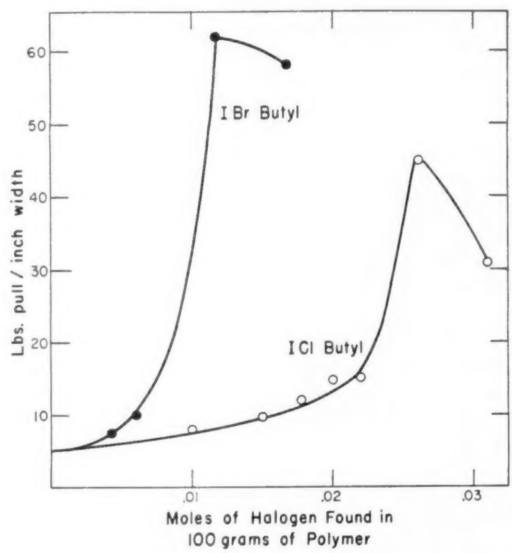


Fig. 12. Halogen content of ICl and IBr butyl adhesives *vs.* adhesion of butyl rubber to natural rubber

ozone resistance (Figure 11). In general the IBr polymers have been more effective than the ICl polymers. This observation, added to the previous evidence that iodine monobromide has been superior to iodine monochloride in producing cure compatibility in butyl rubber, strengthens the theory that the ozone resistance of blends may be associated with cure compatibility.

Adhesion

The poor adhesion obtained between butyl rubber and other elastomers has limited its application in many products. The low unsaturation of IIR which, as we have already noted, was the apparent cause of its poor curing compatibility, may again be the cause of its poor adhesive properties. It is believed that at the immediate bond interface the butyl can be robbed by the more highly unsaturated rubbers of sufficient curing agents to form an adequate bond. The earliest attempts to correct this condition led to precuring the butyl before attempting to bond it to other rubbers. Tiegums of cured IIR have often been used to bond IIR to natural rubber.[10] The most recent development has been the advent of brominated butyl, which has shown a definite advantage over IIR in its adhesion to various rubbers, especially natural rubber and SBR.[3] Excellent adhesion between butyl and most metals has also been realized through the use of brominated butyl as a tie-cement between the butyl and the metal surface coated with a resorcinol formaldehyde resin.

The evaluation of ICl and IBr butyl polymers in adhesion to rubbers and metals has shown that both polymers give almost identical results to those of brominated butyl (Table 4). In each case a 10% cement of the polymer and 40 parts of EPC black in n-heptane was used as the bonding agent between butyl rubber and either natural rubber or resin coated brass. Table 4 indicates that an increase in adhesion of 40 to 50 lbs. per inch pull can be expected from the ICl or IBr butyl as compared to normal butyl. It also shows that halogenation with chlorine is not so effective in producing a suitable adhesive as with iodine monochloride.

TABLE 4. EFFECT OF VARIOUS HALOGENATING AGENTS ON THE ADHESIVE PROPERTIES OF BUTYL RUBBER

Halogenating Agent	Optimum Amount of Total Halogen Moles	Lbs. Pull/In. Width: Butyl to Crude Rubber, R. T.*	Butyl to Crude Rubber, 212° F.	Butyl to Brass, R. T.	Butyl to Brass, 212° F.
Iodine monochloride	0.0264	45	15	100	40
Monobromide	0.0117	62	11	100	50
Bromine	0.018	50	15	100	86
Chlorine	0.0152	2	3	30	17
Chlorine	0.0282	15	½	5	—
None	—	5	0	—	—

*Ambient room temperature.

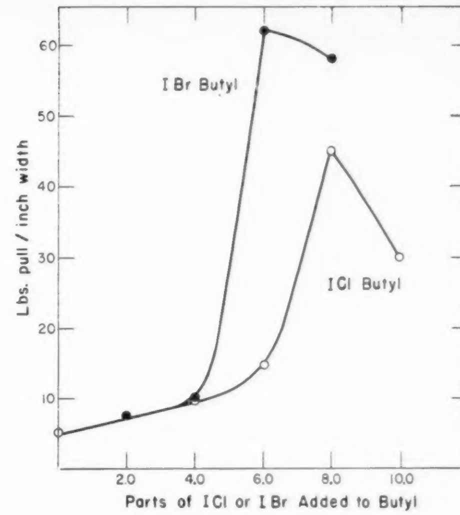


Fig. 13. Halogen halide charge in polymers used as adhesives vs. adhesion of butyl rubber to natural rubber

This is additional evidence that the iodine present in the ICl polymers must have an important function in the adhesive process. Also the best adhesive properties of the ICl polymers have been obtained at a much higher molar concentration of iodine plus chlorine in the polymer than that of either iodine plus bromine in the IBr butyl or of bromine in the brominated butyl (Table 4 and Figure 12). This difference is shown more realistically in a plot of the bond strengths of butyl to natural rubber using the IBr and ICl polymer adhesives as a function of the amount of iodine monochloride and iodine monobromide added to the butyl (Figure 13). The poor adhesive properties obtained with a chlorinated butyl containing chlorine in the greater molar concentration range of the iodine plus chlorine of the best ICl polymer (Table 4) can be adduced as further evidence that the iodine is important in developing better adhesion.

It should be mentioned that the procedure used for bonding butyl to brass with ICl, IBr, and brominated butyl cements can be extended to include practically all metals, since the primer used, a phenolic resin, will adhere to all metals. In the butyl to brass adhesions using these cements the failure has been mostly within the butyl stock itself. Table 4 indicates the relatively poor results obtained with the chlorinated butyl cements in the same adhesive system. Thus the superiority of the ICl butyl, as compared to the chlorinated polymer, is established once again.

Summary and Conclusions

Work on the modification of butyl rubber by bromination has been expanded to include the use of other halogenating agents. The combinations of chlorine or bromine with iodine in the form of iodine

[10] W. H. Halswit, Jr., H. C. Wiechman, U. S. patent No. 2,392,590 (1946); and R. F. Wolf and W. J. Sparks, patent No. 2,442,068 (1948).

monochloride and iodine monobromide have been of major interest. Both of these halogen halides have modified butyl in much the same manner as bromine alone. This discovery has been considered important in view of the fact that iodine and chlorine alone have yielded products which have been inferior to brominated butyl with regard to cure compatibility with other polymers and adhesion to rubber and metal.

The major portion of the halogenation reaction of butyl rubber involves addition to some of the double bonds of the isoprene units. This has been shown by the fact that the mole % unsaturation of butyl decreases as a linear function of the moles of halogen present in the polymer.

As in the case of brominated butyl, the ICl and IBr butyls have shown several properties superior to those of butyl. Among these improvements have been better covulcanization with natural rubber, greater resistance to ozone, and increased adhesion to natural rubber and metals. It has been found that an optimum amount of each halogen is required in the polymer to obtain the best properties.

Studies of the reaction of iodine monochloride and iodine monobromide have indicated that only a portion of the iodine remains in the halogenated polymer. In this reaction hydroiodic acid is believed to split out, leaving the chlorine and bromine still in the polymer. In the vulcanization process the iodine remaining in the polymer probably enters into a metal oxide cure and thus contributes to better cure compatibility with natural rubber and to improved adhesion.

Acknowledgment

The writer wishes to acknowledge the helpful suggestions made by A. E. Juve, D. M. Beach, and E. E. Mooney in the preparation of this manuscript. The writer also wishes to thank A. K. Kuder and coworkers for the determinations of halogen content and mole % unsaturation of the halogenated butyl polymers.

Appendix: Experimental Details

Halogenation of Butyl with Halogen Halides

Butyl rubber was dissolved in ethyl chloride, and the solution cooled to 0° C. The iodine monochloride or iodine monobromide was added with stirring. The reaction was allowed to proceed for two to five minutes. Sufficient caustic was then added to neutralize any excess halogen. After allowing 30 minutes for the neutralization reaction, a stabilizer, Paraplex G-60,[11] was added to the halogenated butyl solution. Stirring of the polymer solution was continued for 15 minutes. The polymer was coagulated by running the cement into 60° C. water. In the process the solvent is flashed off. The polymer crumb was dried, usually overnight, in a vacuum oven at 50° C.

Polymer Analysis

The combined halogen present in the polymers was determined by a modification of the method described by Schenck and Puell[12]. The method involves conversion of the halogen to ionic form by fusion with calcium oxide. After neutralization of the excess lime with nitric acid, the ionic halide is titrated with standard silver nitrate, using a Beckman automatic titrator equipped with glass and calomel electrodes.

The mole % unsaturation of the halogenated butyl polymers was determined by the method described by Gallo, Weise, and Nelson.[13] The method involves the addition of iodine to the double bond, catalyzed by trichloracetic acid and mercuric acetate.

Compounding

The following compounding recipes were used in studying the properties of the halogenated butyl rubbers.

Recipe A Polymer Alone		Recipe B Blends of Polymer and Natural Rubber	
Polymer	100.0	Polymer Natural polymer	100.0
EPC black	40.0	Agerite Stalite‖	1.0
Zinc oxide	5.0	HAF black	35.0
Stearic acid	3.0	Zinc oxide	5.0
MBTS*	0.5	Circosol 2XH§	5.0
TMTD†	1.0	Stearic acid	1.5
Sulfur	2.0	MBTS	0.7-1.0
		DOTG‡	0-0.1
		Sulfur	2.0

* Benzothiazyl disulfide.
† Tetramethyl thiuram disulfide.
‡ Di-ortho-tolylguanidine.
§ Process Oil, Sun Oil Co., Philadelphia, Pa.
‖ A mixture of mono and di-hepty diphenylamines, R. T. Vanderbilt Co., New York, N. Y.

Mill Mixing Procedures

Recipe A

Mill roll temperature was kept at approximately 70 to 80° F. The pigments were added to the polymer in the order given in the recipe.

Recipe B

Mill roll temperature was kept at 150 to 170° F. The natural rubber was milled until a thin smooth sheet was formed. The polymer was banded around the mill rolls, and the natural rubber was added in six portions to the halogenated butyl. The rubber was cut several times after each addition of natural rubber. The remaining pigments were added to the IIR-NR blend in the order shown in the recipe.

Polymer Evaluation

Stress-Strain

Determinations were made in accordance with ASTM D 412-51T. The testing was done at room temperature.

Ozone Resistance

These determinations were made in accordance with ASTM D 1149-55T. The rubber samples were exposed to an ozone concentration of 25 parts per hundred million of air under conditions of 120° F and 20% static elongation. The exposed surface of the samples was one inch by four inches.

Adhesion Strength

(1) Sample Preparation

(A) Butyl to Natural Rubber Adhesion. The IIR and NR compounds were sheeted out to a 1/8-inch thickness. Strips (two by six inches) were prepared and coated with a non-curing halogenated butyl n-heptane cement containing 40 parts of EPC black. The cement was allowed to dry for 15 minutes and the cemented surfaces were placed together. A two- by two-inch sheet of holland cloth was placed between the surfaces at one end in order to insure free ends for pulling. One ply of heavy cotton fabric was placed on the outside of the plied sample for reinforcement.

[11] Rohm & Haas, Philadelphia, Pa.
[12] *Kunststoffe*, 41, 192 (1951).
[13] *Ind. Eng. Chem.*, 40, 1277 (1948).

(*Continued on page 742*)

Economics of Flexible Urethane and Latex Rubber Foams

By PETER B. BAKER
Arthur D. Little, Inc., Cambridge, Mass.

Present-day material costs for flexible urethane foams are higher than for latex rubber foams on a board-foot basis, but it is expected that lower material prices in the future will bring such costs for the two foams approximately in balance.

Detailed process and plant costs are not available, but an examination of the processes used indicates that these costs for urethane foams will probably be slightly higher than for latex foams until major process improvements are made.

URETHANE foam has been of widespread interest in the United States since 1954, when three large chemical companies announced that they would erect large-scale facilities to make isocyanates, important chemical raw materials for urethanes which had previously been available in only small quantities. Since 1954, production processes and application know-how have advanced rapidly, and, today, urethane foam is finding increasing use as a cushioning, insulating, and novelty material.

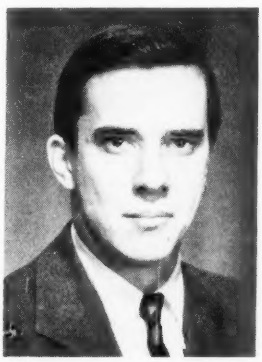
By varying raw materials and reaction conditions, urethane foams may be produced in flexible, semi-rigid, or rigid form. Rigid and semi-rigid urethane foams will undoubtedly find important markets where the combination of ability to foam-in-place with good insulating value, high strength, and light weight is desired, but considerable process and product development work remains to be done before volume use is achieved. Flexible urethane foam has been of greater interest than rigid because of the former's potential use as in comfort cushioning, a well-developed market which consumes more than 200 million pounds of latex rubber foam annually. The purpose of this article is to explore the relative economics of urethane and latex rubber foams as they stand today and as they may develop in the future.

Properties

Numerous comparisons have been published of the properties of flexible urethane foams *versus* those of foam rubber. The early urethane systems based on reaction of isocyanates with adipic acid-based polyester resins had produced foams with a number of undesirable properties as cushioning materials, the most notable of which is the well-known plateau effect. Instead of deflecting uniformly as force is applied, these foams reach a deflection plateau where large additional force causes little deflection and then give way suddenly, leading to "bottoming." Furthermore, the adipate polyester-based foam samples have high compression set and age poorly.

Within the last two years, polyether resins made from propylene oxide and higher glycols have appeared. Urethane foams based on these polyethers not only have better cushioning and aging characteristics than polyester-based foams, but are less expensive. The polyethers are priced between 23 and 35¢ per pound as compared with around 50¢ per pound for the polyesters. Whether low-cost polyether-based foams can be made to be competitive in properties with latex rubber foam for all applications is, however, presently open to question.

A still more recent development is urethane foams



The Author

Peter B. Baker, senior staff member, Arthur D. Little, Inc., Cambridge, Mass., received his Bachelor of Science degree in chemical engineering and business administration from Massachusetts Institute of Technology in 1950.

Mr. Baker was employed by Merck & Co., Inc., from 1950 until late 1953, first doing commercial development for fine chemicals and then as purchasing agent for animal by-products.

From 1953 to date he has been with Arthur D. Little, working in the industrial economics, chemical market research, and commercial development fields, with special reference to plastics and resins.

TABLE 1. COMPARATIVE MATERIAL COSTS—URETHANE AND LATEX RUBBER FOAM

A. Present Conditions

	Urethane Foam		Latex Rubber Foam	
	Slab (Open Molds)	Molded, Cored (Closed Molds)	Slab (Open Molds)	Molded, Cored (Closed Molds)
Finished density—lb./ft.³	2.2	2.7	6.1	3.5
Raw materials—$/lb.				
Urethane:				
Resin @ 23¢/lb. / TDI @ 95¢/lb. / Other @ 43¢/lb.	0.426	0.426	—	—
Rubber:				
Latex @ 30¢ / Aux. mat'ls	—	—	0.23	0.28
Losses:				
Inventory and preparation	2%	3%	5%	3.3%
Gas	5%	7%	—	—
Overflow	—	—	—	6.5%
Defective product	10%	8%	2%	8.0%
	17%	18%	7%	17.8%
Cost before trim loss—$/lb.	0.513	0.52	0.25	0.342
Trim loss	30%	—	—	—
Total material cost—$/lb.	0.734	0.52	0.25	0.342
$/bd. ft.	0.135	0.117	0.126	0.10

B. Probable Future Conditions

	Urethane Foam		Latex Rubber Foam	
	Slab (Open Molds)	Molded, Cored (Closed Molds)	Slab (Open Molds)	Molded, Cored (Closed Molds)
Finished density—lb./ft.³	2.2	2.7	6.1	3.5
Raw materials—$/lb.				
Urethane:				
Resin @ 23¢/lb. / TDI @ 70 ¢/lb. / Other @ 36¢/lb.	.358	.358	—	—
Rubber:				
Latex @ 28¢/lb. / Aux. mat'ls	—	—	.212	.262
Losses:				
Inventory and preparation	2%	3%	5%	3.3%
Gas	5%	7%	—	—
Overflow	—	—	—	6.5%
Defective product	5%	8%	2%	8.0%
	12%	18%	7%	17.8%
Cost before trim loss—$/lb.	0.407	0.436	0.231	0.319
Trim loss	20%	—	—	—
Total material cost—$/lb.	0.509	0.436	0.231	0.319
$/bd. ft.	0.093	0.097	0.117	0.093

made from polyester resins which are in turn made from dimerized fatty acids. These foams are claimed to be competitive in properties and economics with rubber foam, but are in an early stage of development.

The urethane properties and economics shown in this article are those of the polyether-based foams since they are at present the most commercially promising type.

Material Costs

The economics of urethane foam vary widely, depending on the item being manufactured, the process, and the quantity. Basic to all products and processes, however, are raw material costs.

Table 1 shows the comparative material costs for polyether-based open and closed molded urethane foam and latex foam rubber under present-day conditions. Total costs are affected by the following important factors:

Density

The urethane and latex rubber foams shown in Table 1 are comparable in terms of compression or load-carrying ability. Slab latex rubber foam with a density of about six pounds per cubic foot and molded or cored latex rubber foam with an effective density of about 3½ pounds per cubic foot have an RMA[1] compression of about 1½ and are considered medium to soft foams. The bulk of foam rubber production is of this type. Urethane foam with a density of 2.2 pounds per cubic foot has about the same load-carrying ability.

While the compression of latex rubber foam is directly proportional to density, the compression of urethane foam is independent of density within wide limits. It is especially significant that molded, cored latex rubber foam which comprises more than 80% of foam rubber production has an effective density in the piece of 3.5 pounds per cubic foot, although the density of the rubber portion itself is the same as that of slab, over more than six pounds per cubic foot.

Coring is used to improve the cushioning properties of foams by varying the compression to correspond with the expected load distribution and also to save weight. In the case of urethane, the effective density of molded, cored pieces is actually higher than that of slab because the foam collapses and creates regions of high density around the core and mold surfaces. Thus the great weight saving which can be obtained by coring latex rubber foam is not at present available with urethane foam.

Raw Materials

The raw materials used in formulation of flexible urethane foam are an isocyanate, a reactive-hydrogen-containing resin, and an activator system, usually including an amine catalyst, a surfactant, and water.

[1] Rubber Manufacturers Association, Inc., New York, N. Y.

Isocyanates have been known for years, but have only recently come into large-scale commercial availability. Isocyanate capacity in this country is now more than 50 million pounds per year, or enough to make more than 200 million pounds of urethane foams by presently accepted foam recipes; present urethane production is probably at the rate of about 25 million pounds per year.

Table 2 shows the price history of TDI (tolylene diisocyanate), 80-20 mixed isomer. This is the material which has been accepted as standard for flexible foam, partly because it makes a good foam and partly because it can be produced in large volume at low cost. The present price of TDI mixed isomer is 95¢ per pound in tank cars and should be reduced to 70¢ within the next two or three years.

TABLE 2. PRICE HISTORY: TDI—80-20 MIXED ISOMER

Date	Price* (per Lb.)
Oct., 1953	4.00
Oct., 1954	2.05
Jan., 1955	1.40
Mar., 1955	1.20
Mar., 1956	0.95
Present	0.95
Possible 2–3 year future	0.70

* Lowest price for largest quantity.

The propylene-oxide-based polyether resins most commonly used for urethanes are now priced at 23¢ per pound in bulk. Economics of these materials depend on other markets of more importance than urethanes, and we do not foresee a substantial price decline in the future.

The other components of flexible urethane foam systems, catalyst, surfactant, and water, are not inherently expensive, but require some processing before use in the urethane system. Cost of these materials is figured as the average cost of the isocyanate and resin components.

The latex used in the manufacture of latex foam varies in composition, depending upon the type of article being made. In some cases it is already possible to use 100% synthetic styrene-butadiene rubber (SBR) latex; while in others, blends of natural and synthetic latex are used. In addition, inexpensive, inorganic loading agents are now generally used in foam rubber and serve to improve compression and at the same time to reduce raw material costs. We project only a moderate decline in the average price of latex for the future.

Processing Losses

Table 1 indicates that there are substantial material losses in process in the production of both urethane and latex foams. The loss figures for urethane foam shown in Table 1 are based on German and U. S. experience to date and on speculation about future improvements. Inasmuch as closed molding of urethane foam[2] is presently in the experimental stage only, the loss figures shown for this process under both present and probable future conditions are guesses. Experimental losses at present are undoubtedly much higher than the figures shown.

The loss figures for latex foam are based on actual experience and, unless new processes are introduced, probably will not decline in the future because of the high state of development of present latex foam processes.

In the case of urethane foam, the gas loss in process is a serious economic penalty not encountered in the case of latex. The foaming agent in the urethane process is carbon dioxide generated by reaction of isocyanates with water. Since flexible urethane cushioning foams are largely open-celled, this gas escapes and does not contribute to the weight of final product.

Trim Loss

At present, most urethane foam is made in large buns. Because of the loafing effect at the top of the bun, trim loss is high, presently about 30%. With improved process control, this loss may be reduced to 20%.

Much of the trim loss is salable as scrap. At the present urethane scrap price of 6.5-8¢ per pound, scrap generates a credit of 2-2.5¢ per pound on the cost of first-grade foam or about 0.4-0.5¢ per board foot. We have not tried to speculate what may happen to the urethane foam scrap market in the future.

Total Material Cost

Table 1 shows that material costs for molded, cored latex foam at 10¢ per board foot are presently lower than for either slab or molded urethane or slab latex rubber foam, principally because of the weight saving which results from coring the latex rubber foam. In the future, material costs for slab urethane foam will become as inexpensive as for molded, cored foam rubber if the losses are reduced, as shown in Table 1B. (Additional fabrication, however, will still be required to convert the slab urethane foam stock to comparable finished articles, thus adding considerable cost.)

Material costs for molded, cored urethane foam will become almost competitive with molded, cored latex rubber foam, but, as will be discussed, considerable work remains to be done to develop a practical, commercial process for molding urethane foam.

Processing

Urethane

The simplest (one-shot) process for manufacture of urethane foams, usable only for polyester-based foams, involves mixing at one time isocyanate, polyester resin, and catalyst mixture. The process can be carried out in two steps by first reacting isocyanate with resin under controlled conditions to produce a prepolymer

[2] "Molding of Resilient Urethane Foams," by R. E. Knox and W. J. Touhey, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. Presented before Upper Midwest Section, SPE, Minneapolis, Minn., Oct. 8, 1957.

and then later reacting the prepolymer with catalyst and water to produce foam.

The advantages of prepolymer over one-shot operation are better control because the reaction is slower and generates less heat, and greater safety because of the elimination of free isocyanate from the foam-making machine. Disadvantages are higher investment if prepolymer is manufactured rather than purchased, and the possibility of reduced yields if a batch of prepolymer is spoiled.

Polyether-based foams cannot successfully be made by a one-shot process because the total reaction time is 2-3 hours. It is impractical to tie up foam-making equipment for this length of time: and by using a prepolymer, the reaction time in foam-making equipment is kept to a minimum.

Prepolymer can either be manufactured by the foam producer or purchased from a number of formulators, and recently a partial prepolymer has been offered. The latter requires mixing with additional isocyanates before use in the foam process. Because it contains fewer free isocyanate groups than full prepolymers, it is easier to store. Prices for full prepolymer are now about 90¢ per pound, and for partial prepolymer, between 50¢ and 60¢ per pound.

After mixing with catalyst and water in either the one-shot or prepolymer processes, the mixture is delivered almost instantaneously to an open tray or belt which moves continuously under the foaming head, or to individual molds which can be closed. Open-molding produces the large buns of foam which are subsequently slit, die-cut, or otherwise fabricated to finished shapes; closed-molding, of course, produces finished shapes directly. We have pointed out the high loss involved in trimming open-molded buns down to usable, first-quality products. Open-molding has the advantage that the mixing machine can be operated continuously; whereas in closed molding it must be operated intermittently.

Polyester-based foams are virtually cured when the foaming reaction is complete, that is, within minutes of mixing and pouring. A short heat-cure is generally used to drive off the volatile catalyst. Polyether-based foams, on the other hand, require a post-cure of more than two hours at 250° F. and several days of aging to develop maximum properties. Some testing to date indicates that polyether-based foams do not develop maximum compression set properties until after one to two weeks of aging. If the products are large buns, and if they must have maximum compression set properties (as in the case of automotive and furniture cushions), they cannot be fabricated until they have been aged.

The continuous, open-molding process for urethane foams is well-developed and operating commercially in numerous plants in the U. S. Where the amount of fabrication which must be carried out on the buns is small, as in the case of slitting into thin sheets for rug underlay or garment interlinings, the processing cost for the finished foam article is probably little more than for slab foam rubber. However, as mentioned, more than 80% of foam rubber production is of molded shapes, mostly contoured cushions. It is obviously not possible to make the same shapes competitively from urethane slab since it starts with higher material cost and, unlike the molded rubber piece, must then be subjected to fabrication with consequent added processing costs and additional scrap penalty.

Closed-molding of urethane is in an early stage of development, and much remains to be done before the process is reduced to efficient commercial practice. Two major problems have been mentioned: the increase in density resulting from collapse of cells at mold surfaces, and the long in-process cycle. More important, it is difficult at present even to obtain commercially acceptable closed-molded urethane pieces. The heart of the problem is to deliver just the right amount of mixed ingredients rapidly to the mold before it is closed. Since foaming takes place in essentially only one direction, the mold must be filled to the edges; if too much material is deposited at any one point, a region of high density will result.

Using present mixing and distributing heads, it is difficult to fill molds satisfactorily. Some work to date indicates that the foaming mixture itself must have within 1.5% of stoichiometrically correct amounts of ingredients if serious quality problems are not to arise. Figure 1 shows part of the urethane closed molding equipment in the laboratory of the Du Pont company in Wilmington, Del.

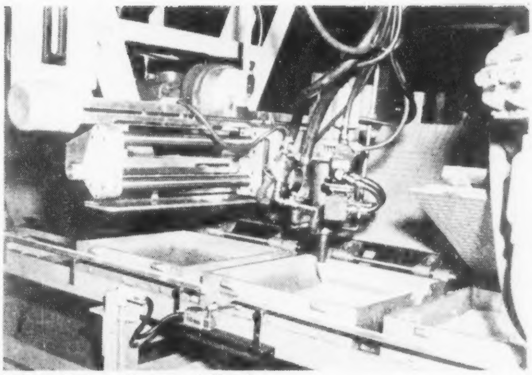
Latex

As mentioned, latex foam rubber processes have reached a high state of technological development. Slab foam is produced continuously with negligible waste. The compounded latex is delivered to a continuously moving belt on which it is spread and leveled mechanically, carried through a curing oven at about 155° F. and automatic washing and drying cycle to a finishing table, on which it is cut to length, rolled up, and dropped into shipping containers. The entire in-process cycle is less than half a day.

Production of molded cushions is also highly automated. The compounded latex is filled into molds from a hose, is leveled manually in the mold; the molds are automatically closed and carried through a curing cycle, automatically opened; and the cushions carried through an automatic washing and drying cycle. From the drier, they are inspected, boxed, and shipped. In some cases, half cushions are glued together to from full cushions. Again, the entire in-process cycle is less than one day. (See Figure 2.)

Process Costs

Detailed figures are not available for processing costs of either urethane or latex foam rubber. Process costs for production of slab urethane are believed to be about 20% of the total cost per pound, or less than 4¢ per board foot. On the basis of the qualitative considerations outlined, the processing costs for polyether-based urethane foam would appear to be higher than for latex foam because of the handling and inventory charges involved.



E. I. du Pont de Nemours & Co., Inc.

Fig. 1. Closeup of part of the closed-mold urethane foam equipment at the Du Pont laboratory. The mold leaves the preheat oven at left and is opened automatically. Here, a mold is being filled at the pouring station. Overhead is a traversing mechanism to provide an even fill in each mold. The mold lid is automatically closed and locked into position as it passes through the precure oven on the right

Plant

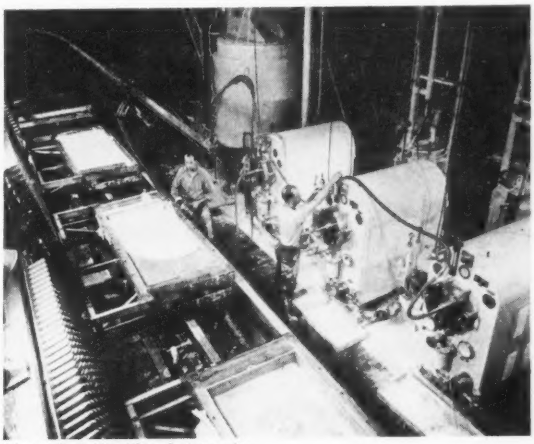
The simplest facilities for urethane foam production are storage tanks for raw materials, metering pumps, a mixing and pouring device, machinery for removing the foaming mixture from under the mixing head, and equipment for fabricating the finished foam. Using the one-shot process for polyester-based foams, a capacity of about five million pounds per year can be purchased for an investment of around $150,000, not including buildings, land, services, laboratories, and pre-start-up research and development costs.

If polyester-based prepolymer is purchased, the investment can be reduced to about $100,000, and if prepolymer is manufactured, the investment increases to about $200,000. Amortization on a five-year, straight-line basis is under 1¢ per pound, even for a producer manufacturing his own prepolymer. Equipment cost for polyether-based foams is higher because of the curing equipment required.

Capacity of foam-making equipment is variable, depending on the process being used. For example, the large one-shot German machines, of which there are several operating in the U. S., are generally stated to have a practical capacity of 8-10 million pounds per year of foam on continuous operation. On intermittent, closed-molding operation, however, their capacity might be no more than 4-5 million pounds per year of material, if, indeed, they can be adapted to intermittent operation at all.

A molding line with a capacity of 8-10 million pounds per year of latex foam costs in the neighborhood of $1¼ million. In view of the increased curing time required for urethane and the complexity of the mixing and pouring equipment, it seems unlikely that a plant of similar capacity (on a board-foot basis) for closed molding urethane would cost substantially less. While washing and drying equipment would not be required, extra curing equipment would.

Fig. 2. View of latex foam rubber production line at plant of Dunlop Tire & Rubber Co., Buffalo, N. Y. Foaming machines inject air into latex mixture. Molds are filled as they pass pouring station on conveyor. Mold lids close automatically



Mechanical Handling Systems, Inc.

Summary

Present material costs for flexible urethane foams are higher than for latex foams on a board-foot basis. It is probable that declines in raw material prices in the future will bring material costs for the two processes approximately into balance. Detailed process and plant costs are not available, but an examination of the processes leads to the conclusion that these costs for urethane will probably be slightly higher than for latex until major process improvements are made. Urethane foam technology is in an early stage of development, and the inherent chemical versatility of the material points to the possibility of developing unique products for markets which presently do not use foams.

2-Aminobenzenethiol Now Available

2-Aminobenzenethiol, a highly reactive bifunctional aromatic compound, is now offered by the intermediates department, American Cyanamid Co., New York, N. Y.

2-Aminobenzenethiol undergoes reactions typical of the amino and mercapto groups. When reaction occurs at both groups, cyclic thiazole or thiazine derivatives are formed. With organic carboxylic acids, anhydrides, esters, halides, amides or nitriles, 2-aminobenzenethiol and its metal salts react to give 2-substituted benzothiazoles. It has been reacted with monobasic and dibasic aliphatic, aromatic, and heterocyclic acids. A colorless liquid, 2-aminobenzenethiol boils at 227.2° C. and solidifies at 23.0° C.

Its reaction with aldehydes yields benzothiazolines which oxidize readily to the corresponding benzenethiazoles. These derivatives find use as cyanine dyes, thiazole dyes, and rubber accelerators.

Silicone Rubber Reclaim[1]

By B. R. WENDROW and D. P. SPALDING
U. S. Rubber Reclaiming Co., Inc., Buffalo, N. Y. *General Electric Co., Waterford, N. Y.*

Silicone scrap may be reclaimed by either the "wet" process or the "dry" process. Regardless of the state of cure of the scrap, it has been demonstrated that reclaiming is always possible.

Blends of reclaim and virgin stock produce a vulcanizate having physical properties very close to those of the original silicone stock provided the amount of reclaim in the blend is kept below a 20% critical level. Blends in excess of 20% reclaim require additional curing agent in proportion to the amount of reclaim used.

Shrinkage of reclaim blends is not a problem since it is usually significantly less than that of the virgin material.

Although reclaim blends extrude satisfactorily for preforming operations, surface irregularities preclude their use for finished extruded goods. Reclaim blends, however, are recommended for molding jobs.

The data reported in this work are restricted to the use of reclaim blends with virgin stock of the same class. No data are available at this time on blending with different classes or even with different commercial grades within a class.

SILICONE rubber technology has come a long way from its early "bouncing putty" days. Along with the advancing technology, the use and the number of silicone compounds and gums available have increased many fold. This growth is a natural one, particularly when applications for the polymer become not only more widespread, but more exacting as well.

With the growing use of silicone rubber, the generation of silicone scrap has reached significant proportions. As in the past with other rubbers, it has become economically desirable to utilize the growing scrap pile.

It is no longer news that silicone scrap can be reclaimed. Most experienced fabricators have used reclaimed silicone rubber, some occasionally, others more regularly. The purpose of this paper is to report, such data as our studies have produced regarding the properties of silicone reclaim and to offer suggestions on the efficient and proper use of such material.

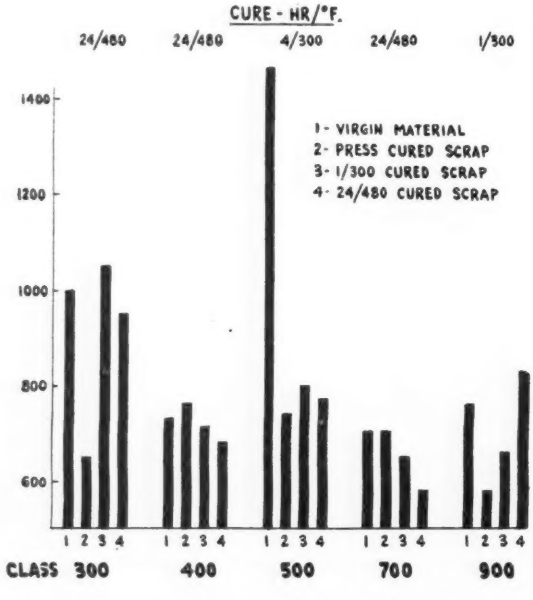


Fig. 1. Tensile strength at break, psi.

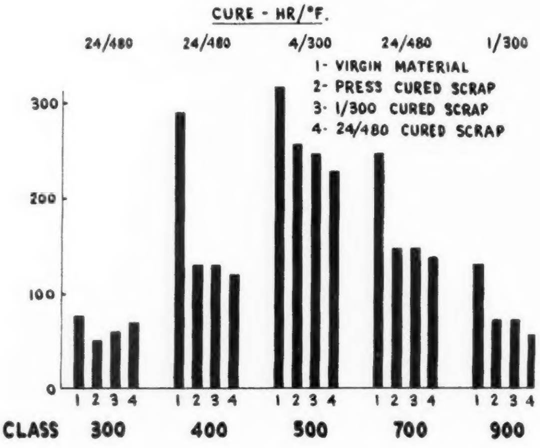


Fig. 2. % Elongation at break

That various commercial types of silicone rubber compounds are available is a well-known fact. In general, these types fall into five arbitrary classes. The classification is called arbitrary because it is based on the predominant cured property or processing characteristic of the compound rather than on the fundamental chemical architecture of the base polymer. This paper will consider the reclaiming of typical members of each of the following classes of General Electric Co.'s silicone rubber: (1) low compression set class, Class 300; (2) general-purpose class, Class 400; (3) extreme low-temperature class, Class 500; (4) extreme

[1]Presented before the Division of Rubber Chemistry, ACS, New York, N. Y., Sept. 11, 1957.

high-temperature class, Class 700; (5) wire and cable class, Class 900.[2]

"Wet" Reclaiming

Cured silicone rubber scrap may be reclaimed by either of two methods which we call the "dry" process and the "wet" process. In the "dry" process the scrap is cut to a uniform size and worked on a two-roll mill until a continuous, though grainy sheet is formed. In the "wet" process the scrap is autoclaved in steam prior to the mill-working step.

Experience has shown that with most silicone scrap the "wet" process reclaim is more uniform and generally more plastic and "rubbery" than the corresponding "dry" process material. Depending on the ultimate processing requirements of the fabricator, conditions in the "wet" process can be controlled to provide silicone reclaim with the most suitable processing characteristics. All the silicone reclaim used in this study was produced by a multi-stage wet process.

Reclaim Properties vs. Cure

The properties obtained with reclaimed silicone rubber are somewhat dependant on the state of cure of the scrap prior to reclaiming.

Figures 1-5 show the effect of the scrap state of cure on the physical properties of the corresponding reclaimed rubber. Figure 1 shows tensile strength at break; Figure 2 shows elongation at break; Figure 3, Shore A hardness; Figure 4, tear strength;[3] Figure 5, compression set (70 hrs./300° F.).

Each figure contains a set of four bar graphs for virgin material, press cured scrap, air cured scrap (one hour at 300°F. and 24 hours at 480° F.) of each of the five major classes of rubber considered, in which the property of the cured reclaim is compared with the corresponding property of the cured virgin material.

In each case the comparision is made at a state of cure most typically used with the particular grade of rubber in question.

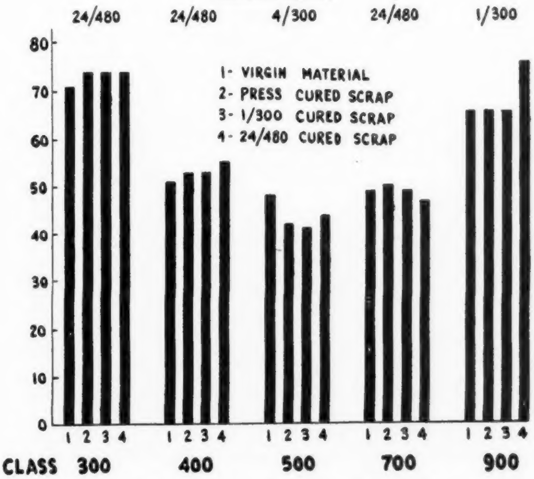


Fig. 3. Hardness—Shore A durometer


Benjamin R. Wendrow David P. Spalding

The Authors

Benjamin R. Wendrow, technical manager, U. S. Rubber Reclaiming Co., received his B.Ch.E. degree from Cooper Union Institute of Technology in 1940.

Upon graduation Mr. Wendrow joined the Corps of Engineers, U. S. Army. From 1943-1946, while still in the Army, he was associated with the Manhatten Project at the University of Chicago, Oak Ridge, and Los Alamos.

In 1946, Mr. Wendrow entered the rubber industry as a research chemical engineer with the U. S. Rubber Reclaiming Co.; in 1957 he was appointed technical manager.

Mr. Wendrow is a member of the American Chemical Society, its Division of Rubber Chemistry, and the Buffalo Rubber Group.

David P. Spalding, technical service specialist, General Electric Co., silicone products department, received his B.A. degree from Lawrence College in 1942, his M.S. from Pennsylvania State University in 1943, and his Ph.D. from the latter school in 1948.

Dr. Spalding was a research chemist with S. C. Johnson & Son, Inc., from 1948 until 1951; he has been with General Electric since 1951.

This author is a member of the American Chemical Society and its Rubber Division, and of the American Ordnance Association.

Figures 1-5 present a relatively large amount of data, and the details are relatively unimportant in view of the broad generalizations which stand out.

1. Useful reclaimed silicone can be prepared regardless of the scrap cure state.
2. A more uniform silicone rubber reclaim is produced from long-cure scrap.
3. Generally, the cured properties of 100% silicone reclaim do not match those of the virgin material ex-

[2]Other silicone rubber producers code these five classes according to their own numbers or letters.

[3]ASTM Method D 624-54, Die B. American Society for Testing Materials, Philadelphia, Pa.

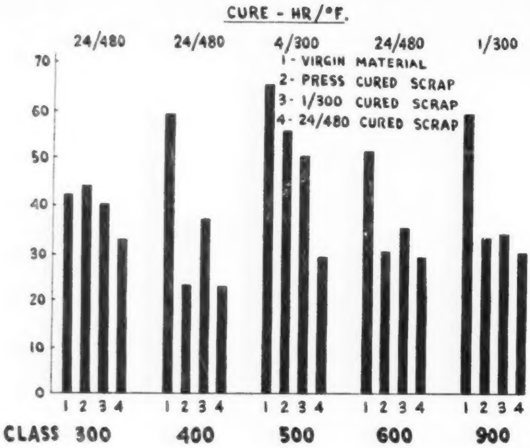


Fig. 4. Tear strength, lb. per in.—ASTM Die B

cept in compression set. Compression set of the cured reclaim is usually better than that of virgin stock.

Properties of Blends

Having generalized on the characteristics of silicone reclaim, we now take up the next and more important topic: to determine the effect on cured physical properties when silicone reclaim is used in conjunction with virgin stock.

A property-profile has been obtained for one typical member of each of the five general classes of the silicone rubber mentioned previously. For each particular compound the reclaim derived from the scrap at the most "normal" state of cure has been used with the corresponding virgin stock at 0, 10, 20, 50, and 100% levels. Each blend has been characterized at two states of cure.

These data are shown as a set of curves in Figures 6 through 10, with one figure for each of the five stocks

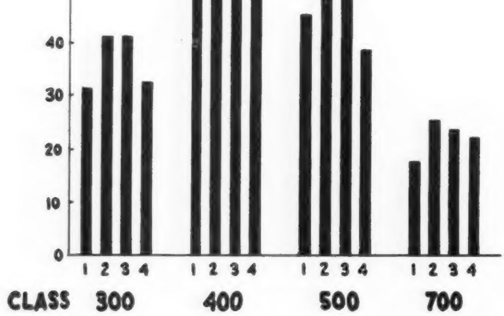


Fig. 5. % Compression set, 70 hrs. @ 300° F.

being considered. The broken line curve represents the blends cured one hour/300° F., (except Figure 8) and the solid line, the blends cured 24 hours/480° F. Study of these data indicates some interesting general effects of the use of reclaim on the various properties normally considered and are summarized below:

(1) Tensile Strength usually decreases with increasing quantity of reclaim. In higher strength stocks this characteristic is more noticeable than in normal strength stocks. Where the effect is severe, it is usually noted in the first increment of reclaim loading.

(2) Elongation at break usually drops with increasing quantity of reclaim. Again, this trend is most noticeable in high elongation stocks. Where the effect

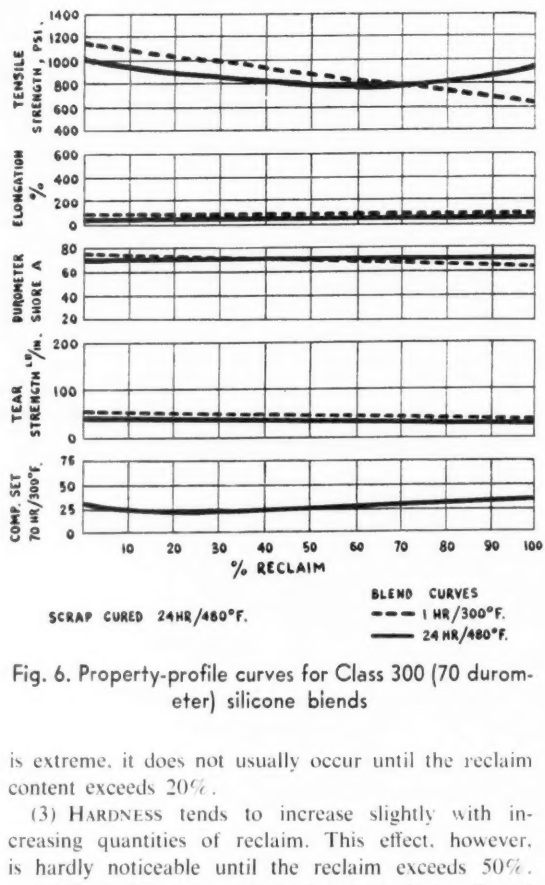


Fig. 6. Property-profile curves for Class 300 (70 durometer) silicone blends

is extreme, it does not usually occur until the reclaim content exceeds 20%.

(3) Hardness tends to increase slightly with increasing quantities of reclaim. This effect, however, is hardly noticeable until the reclaim exceeds 50%.

(4) Tear Strength of the blends is little affected up to 20% reclaim content. In fact, there is some indication that a slight improvement over the virgin stock is to be expected around the 10% reclaim content when Class 700 and 900 reclaims are used.

(5) Compression Set usually improves with increasing quantities of reclaim for normal compression set stocks.

In the case of low compression set compounds, this same improvement is noted, although it is only evident under 50% reclaim content.

It is apparent, therefore, that in most cases up to 20% reclaim blends can be used, and in many cases higher levels, without serious effects on the cured properties of

the virgin material. The most marked effects are in lowered tensile and elongation of high strength stocks. Incorporation of reclaim often has a desirable effect on compression set and to a lesser degree on the tear strength.

This summary is a brief and general look at the effect of reclaim on the physical properties of cured silicone rubber without regard to state of cure. We will now consider the problem of curing blended stock.

Curing of Reclaimed Blends

When blends containing up to 20% reclaim in virgin stock are used, no additional curing agent is needed. Above the 20% level, curing agent should be added in proportion to the quantity of reclaim used. Reclaim must be considered uncatalyzed stock.

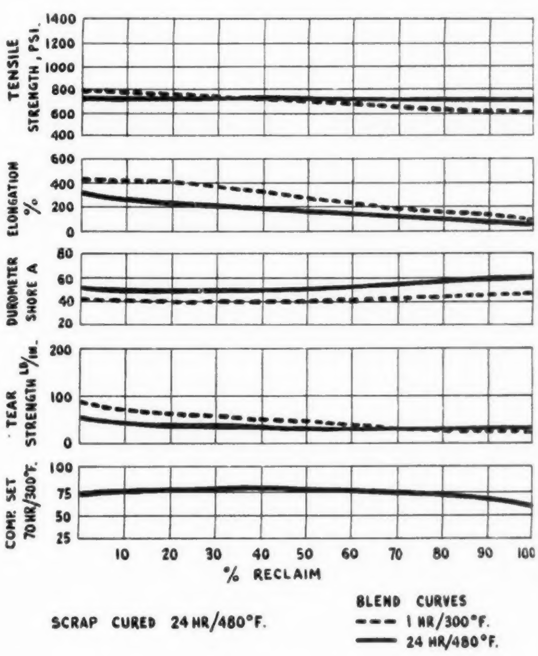


Fig. 7. Property-profile curves for Class 400 (50 durometer) silicone blends

Reclaimed stocks based on vinyl-containing gums have lost the curing sensitivity inherent in the virgin material. Thus, at the 100% level such reclaimed stocks cannot be cured with mild curing agents such as ditertiary butyl peroxide (DTBP) or dicumyl peroxide (Di-Cup). Low reclaim level blends however can be cured with these systems if the virgin material is a vinyl-gum based polymer.

Shrinkage of Reclaim Blends

When a hot section of rubber cools, dimensional changes take place. This shrinkage may be either isotropic or anisotropic and in any event is an important variable of molding and extrusion processes.

Incorporation of reclaim into a stock will have a definite effect on the shrinkage of the blend. Usually, reclaimed stock is lower in shrinkage than the virgin

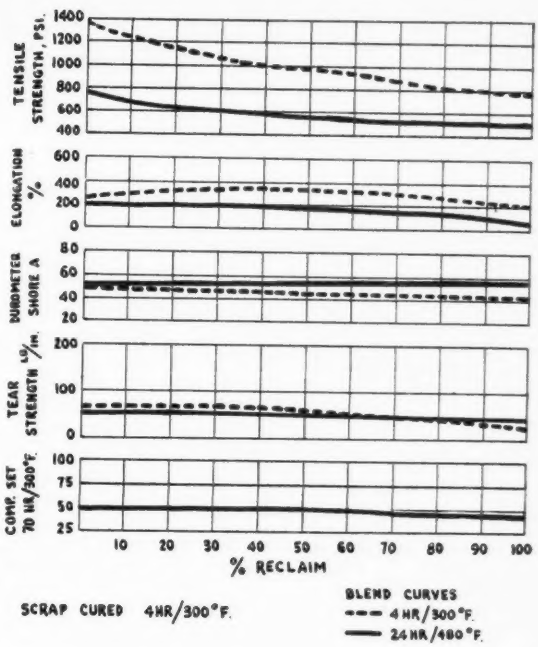


Fig. 8. Property-profile curves for Class 500 (50 durometer) silicone blends

material. Therefore the shrinkage of blends will be intermediate between that of virgin material and reclaim, depending on the proportions of each used.

In the case of low-shrinkage silicone stocks, this effect is not nearly so noticeable as for other stocks. In some such cases no significant difference in shrinkage between virgin stock and reclaim can be noted.

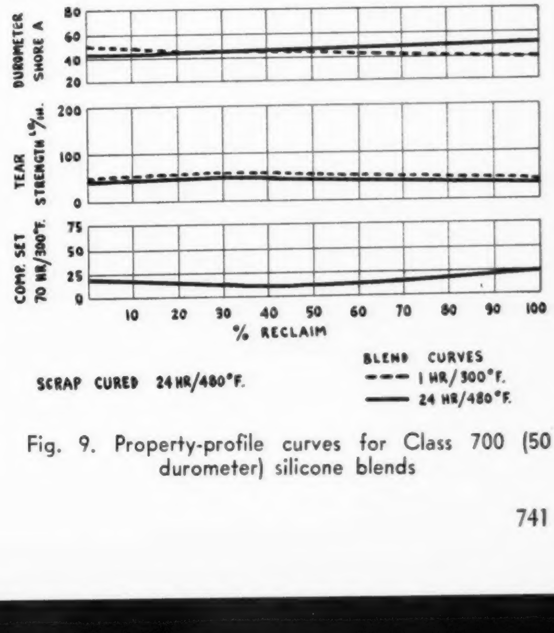


Fig. 9. Property-profile curves for Class 700 (50 durometer) silicone blends

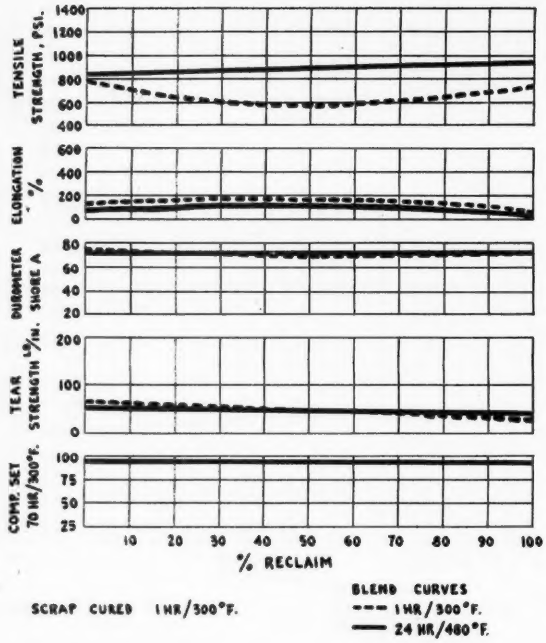


Fig. 10. Property-profile curves for Class 900 (70 durometer) silicone blends

The important fact is that the shrinkage of the blend will usually be lower than that of the virgin stock. Each blend should therefore be characterized as to shrinkage prior to using it for moldings.

Processing of Reclaim Blends

Although most of the important physical properties and chemical eccentricities of reclaim blends have been discussed, a brief word is in order about the molding and extruding character of blends.

Reclaim and blends containing reclaim mold well. It is important, however, that shrinkage be checked, as pointed out previously. The shelf life of blends containing reclaim—that is, the time between freshening and molding—is usually less than that of virgin stock that is, the blends must be molded sooner after freshening than the virgin stock.

Reclaimed stocks and blends containing them extrude satisfactorily for preforming operations; but because of surface irregularities these stocks have not proved satisfactory for finished extruded goods. There is some evidence to indicate that an additional refining or fine screening step during the reclaiming procedure will make a more suitable material for extrusion.

Reclaim and its blends with virgin stock can be cured by any normal means, that is, compression molding, steam vulcanizing, or hot air (ambient pressure) vulcanizing. Since the last is used almost exclusively with extrusion forming, this fact is really only of academic interest at the moment.

Summary and Conclusions

This study has been restricted to facts on the use of reclaim blends with virgin stock. At this time no data are available on blending with different classes or even with different commercial grades within a class. Our work to date, however, has established these useful guides:

1. "Wet" process silicone reclaim has a useful place in silicone rubber compounding.
2. Any cured silicone rubber scrap can be reclaimed, regardless of state of cure of the scrap.
3. Blends of reclaim up to 20% in virgin stock produce cured rubber with a physical property-profile very near that of the virgin stock—except for tensile and elongation of high strength stocks.
4. The use of reclaim is recommended for molding jobs only. The shrinkage of a blend will usually be significantly less than that of the virgin stock.
5. In blends above 20% reclaim, curing agent must be added in proportion to the amount of reclaim used.
6. Blends of vinyl-containing stocks with virgin material can be cured with DTBP; although 100% reclaim of this type cannot be satisfactorily cured.

Halogenation of Butyl Rubber

(Continued from page 732)

The assembly was cured in a ¼-inch mold. A one-inch wide strip was cut from the center of the cured sample.

(B) BUTYL TO BRASS ADHESION.[14] The brass (70/30) was cut into two- by four-inch strips. The metal surface was gritblasted and after cleaning with benzene immediately coated with a 50/50 mixture of Bostik[15] 7040 A and B resin solutions. The resin solution was dried 15 minutes at room temperature and five minutes at 60° C. in an air circulating oven. One coat of the non-curing halogenated butyl n-heptane cement was brushed on to the surface of the butyl compound and resin-coated brass. The cemented surfaces were allowed to dry for at least 15 minutes and then placed together. A two- by two-inch sheet of holland cloth was placed between the surfaces at one end. The outer surface of the butyl was reinforced with heavy cotton fabric. The samples were cured in a ¼-inch mold. A one-inch wide strip was cut from the center of the cured butyl.

(2) Adhesion Evaluation

The pounds pull per inch width was determined by pulling the free ends of the samples in a Scott L-8[16] machine. Screw clamps were used to hold the sample in position. The ends of the sample were pulled at the rate of two inches per minute. The bond strength at 212° F was determined by placing the sample in an air circulating oven for one hour at 212° F. and pulling at room temperature immediately upon removal from the oven.

[14] 70% copper—30% tin.
[15] B. B. Chemical Co., Cambridge, Mass.
[16] Scott Testers, Inc., Providence, R. I.

NEWS of the RUBBER WORLD

The International Cooperation Administration has revealed that during the period January 1, 1954, through June 30, 1957, American firms did over $2 billion worth of business in producing goods for export under the foreign aid program. Nearly $17 million went to an estimated three-score rubber industry companies.

The Federation of Malaya's reversal of position on a natural rubber price stabilization agreement at the June International Rubber Study Group meeting appears to be tied in with an agreement by the United States not to liquidate our 1.2-million-ton stockpile.

The Big Four rubber companies have agreed to an 8¢-an-hour wage boost for United Rubber Worker employes in exchange for a delay until April, 1959, on further pension and insurance improvements. Some price increases for rubber products have been announced.

The Department of Commerce began a survey in July to determine if American businesses' investment of private capital abroad has more than doubled from the $12-billion level in 1950, when the first postwar survey of private foreign investments was made.

The Rubber Manufacturers Association's Molded, Extruded, and Sponge Rubber Products Subdivision held a "Sales Management Clinic" at its annual meeting in June. Some of the results of a questionnaire circulated in that branch of the industry on such things as field salesmen's reports, sales methods, entertainment expense, were revealed. Urethane rubber, anti-trust laws, and the national economic outlook were also discussed by invited speakers.

The Firestone Tire & Rubber Co. has announced the development of a new polybutadiene rubber called "Diene," made in a manner similar to its synthetic polyisoprene, or "Coral" rubber. Both are reported as useful replacements for natural rubber in tires and other rubber products.

The University of Akron will celebrate the Fiftieth Anniversary of the Teaching of Rubber Chemistry at the University and will establish the Rubber Science Hall of Fame in Akron on October 3, 1958.

MEETINGS

and REPORTS

ASTM Committee D-11 Boston Meeting; Many Important Actions Approved

Committee D-11 on Rubber and Rubberlike Materials and 24 subcommittees held meetings as a part of the 61st annual meeting of the American Society for Testing Materials in Boston, Mass., June 22-27. Committee D-11 and its subcommittees met June 25, 26, and 27.

Features of the meeting of the parent Society were the Edgar Marburg and H. W. Gillett Memorial Lectures, the former entitled "Man and Raw Materials" given by E. W. Pehrson, chief of the Division of Foreign Activities of the U. S. Bureau of Mines, and the latter on the subject of "High Temperature Metals—Their Role in the Technological Future," by Clyde Williams, president of Clyde Williams and Co., and former director of Battelle Memorial Institute.

The Exhibit of Scientific Apparatus held during the ASTM meeting included exhibits by more than 60 manufacturers of testing apparatus. Among the manufacturers presenting equipment of interest to the rubber industry were the following: American Instrument Co., Baldwin-Lima-Hamilton Corp., Brookfield Engineering Laboratories, Inc., Instron Engineering Corp., Tinius Olsen Testing Machine Co., Ozone Research & Equipment Corp., Scott Testers, Inc., Testing Machines, Inc., and Thwing-Albert Instrument Co.

D-11 Meeting

Committee D-11 met on the morning of June 27, with chairman Collier presiding. The first order of business was a proposal to increase the membership of the advisory committee from the present three officers and four members to a total membership of 10, with the former D-11 secretary, A. W. Carpenter, as a permanent member of the advisory committee. A motion was made and passed to change the by-laws of D-11 to arrange for this increase in the membership subject to letter ballot in D-11.

L. V. Cooper, Firestone Tire & Rubber Co., chairman of the nominating committee, reported the nomination of Mr. Collier for chairman for another two years, H. G. Bimmerman, E. I. du Pont de Nemours & Co., Inc., for vice chairman; J. J. Allen, Firestone, for secretary; and I. D. Patterson, Goodyear Tire & Rubber Co.; and W. A. Frye, Inland Mfg. Div., General Motors Corp.; as new members of the advisory committee. The officers and advisory committee members were elected unanimously by a voice vote.

The appointment of W. C. Tyler, B. F. Goodrich Research Center, as a representative of Committee D-11 on the new Committee E-15, which has been formed to develop standard methods of anaylsis of industrial chemicals in cooperation with other committees of ASTM, was approved.

Mr. Collier reported that he had attended two meetings of the new ASTM committee on flexible barrier materials and that if any members of D-11 are interested in participating in the work of the committee they should inform the officers of D-11 and they will be appointed to the new committee.

Committee D-13 on Textiles, through its subcommittee 9 on tire cord, has asked for comment on the jurisdiction of D-13 and D-11 on such materials. A task group from D-11 considered this matter on June 18 and it has been decided with D-13 that D-13 will be responsible for measurement of tire cord properties as such and D-11 will be responsible for procedures for measuring the adhesion of tire cord to rubber.

Improved liaison with the ASTM-SAE Technical Committee on Automotive Rubber will be attempted. D-11 subcommittee chairmen are requested to send minutes of their meetings to the chairmen of the equivalent section of Tech. A. and *vice versa*, and the chairman of D-11 will again circulate a letter among subcommittee chairmen emphasizing the importance of improved liaison with Tech. A. In addition, since Tech. A. is sponsored by D-11 and is really a subcommittee of D-11, a representative on ISO/TC 45 from Tech. A. should be appointed, and the chairman of D-11 will write the chairman of Tech. A in this connection.

Committee D-11 recommends that all work pertaining to gaskets and packings be carried out by subcommittee 6 of D-11 and section Xc of Tech. A., and that no new committee for this purpose be formed at the present time.

It was reported that the request for dues from members of D-11 had resulted in a fund of $424.

The next meeting of Committee D-11 will be held in Pittsburgh, Pa., February 4, 5, and 6.

Subcommittee Meetings

Subcommittee 3—Tests of Thread Rubber. K. F. Cullison, B. F. Goodrich Co., chairman. The Proposed Methods of Test for Rubber Thread will be submitted for letter ballot in the subcommittee and, if approved, will be recommended for letter ballot in Committee D-11 for adoption as tentative standards.

A poll will be taken of subcommittee 3 in connection with the use of Scott Testers IP-2 machine as an apparatus recommended for use in standard methods of test for rubber thread. The variety of clamps used to prevent slippage and the limited use of the compensating carriage reduces the value of this machine for thread testing at the present time.

A study will be made of methods of heat and accelerated shelf aging of rubber thread; the thread will be aged in both the stretched and unstretched condition.

Subcommittee 5—Wire and Cable. C. H. Seaberg, General Electric Co., acting chairman. Subcommittee 5 is continuing its work on the standardization of aging methods and air ovens in cooperation with subcommittee 15 on Life Tests and Committee D-20 on Plastics.

A proposed specification for "Synthetic Rubber Insulation for 75° C. Use in Wet and Dry Locations at Operating Voltages Not Exceeding 2000 Volts," will be submitted to letter ballot in the subcommittee.

A change in D 470-56T, Methods of Testing Rubber and Thermoplastic Insulated Wire and Cable, paragraph 42a, to make this paragraph read as follows: "The insulation shall show no cracks or surface checking," will be submitted to letter ballot in the subcommitte.

The specification section was requested to work on specifications for 75 and 90° C. neoprene jackets for use on the higher temperature insulations which are now available.

The subcommittee acknowledged with regret the impending retirement of S. J. Rosch, Anaconda Wire & Cable Co., who has been active in the work of subcommittee 5 for many years and recommended that Mr. Rosch be made an honorary member of Committee D-11.

Subcommittee 6—Packings. R. F. Anderson, B. F. Goodrich Co., chairman. A progress report on the stress relaxation test program in section Xc

of ASTM-SAE Technical Committee on Automotive Rubber was presented. Four single bolt fixtures equipped with strain gages are being circulated to the participating laboratories but the results of this work are not yet complete. The work on the sealibility round robin test program, also underway in section Xc of Tech. A, was described also.

The chairman reported on the corrosion program initiated in section Xc of Tech. A, to the effect that several proposed methods, including an aqueous extraction of the gasket material and measurement of the conductivity of the extract, were being considered.

In connection with the work being done to bring D 1147, Method of Test for the Compressibility and Recovery of Gasket Materials, into closer conformity with D 1170, Specifications for Non-Metallic Gasket Materials for General Automotive and Aeronautical Purposes, it was recommended that any action required to bring the conditioning procedures in the two standards into complete agreement be delayed until D 1170-58T is actually in print.

A report on the Conference on Standards for Gaskets and Packings held at the ASTM headquarters on May 1 was given by M. H. Kapps, F. D. Farnum Co., chairman of a study group appointed at that meeting to determine whether the various industrial groups desire further standardization of packings and gasketing materials. Subcommittee 6 decided that if a general gasketing committee is recommended, the scope of section Xc of Tech. A. be enlarged as needed to act with subcommittee 6 on all work pertaining to gaskets and packings and that no new committee be formed.

Comments on Interim Federal Specification HH-P-00151e, Packing, Rubber; Cloth inserted, dated February 6, 1958, were discussed.

The proposed revision of MIL-G-12803A includes a conflict with 1170 in the method of calculating compressibility after oil immersion. Subcommittee 6 will attempt to resolve this conflict with Rock Island Arsenal, the controlling government agency for the specification.

C. K. Chatten, N. Y. Naval Shipyard, reported that a specification covering cylinder liner seals will be issued shortly by the Bureau of Ships.

Subcommittee 7—Rubber Latices. G. H. Barnes, Goodyear, chairman. The ISO/TC 45 proposal for the determination of density of latices (Secretariat 19) contains no correction factor for temperature and the subcommittee asked R. D. Stiehler, National Bureau of Standards, head of the American delegation to ISO/TC 45 to inform Mr. Weston, technical director of ISO, that such a correction factor is considered necessary.

ISO/TC 45 document 379 on Determination of Volatile Fatty Acid Number was approved, subject to corrections covered in a letter from Dr. Stiehler to Mr. Frost of the American Standards Association.

A suggestion by G. W. Drake of the Rubber Research Institute of Malaya to use 0.5N ammonium hydroxide in place of distilled water for dilution in the mechanical stability test procedure was discussed, and it was decided not to change ASTM procedure at this time.

Low ammonia latices stabilized with boric acid give high KOH numbers. Mr. Drake supplied the subcommittee with a test for determining boric acid in latices. A task group will investigate the method and report at the next meeting of subcommittee 7. If the method is suitable it will be incorporated as a part of the ASTM methods for use where necessary.

A task group will also investigate the dilution of latices to 8% total solids, instead of the 25% total solids used in the dry rubber content method as a means of reducing the drying time.

Subcommittee 8—Nomenclature and Definitions. R. G. Seaman, RUBBER WORLD, chairman. The D-11 letter ballot on the "Proposed Tentative Recommended Practice for Nomenclature for Elastomers" resulted in 120 affirmative and 4 negative votes. The negative votes were all directed at the definition for "rubber and rubbberlike materials" and the definition for "vulcanization." Editorial changes in the remaining definitions were adopted, and it was recommended that with these changes the remaining definitions be adopted by Committee D-11 but that they should be called "Tentative Definitions of Terms Relating to Rubber and Rubberlike Materials," instead of "Tentative Recommended Practice for Nomenclature for Elastomers."

It was voted that the work of subcommittee 8 should be directed towards the development of tentative nomenclature and definitions for the rubber industry, selecting what the subcommitte considers to be the most important terms from the 1956 ASTM Special Technical Publication No. 184, "Glossary of Terms Relating to Rubber and Rubberlike Materials," and elsewhere.

The chairman read a letter from C. W. Halligan, treasurer of the Rubber Manufacturers Association, addressed to subcommittee 8, in which Mr. Halligan emphasized the immediate need for a definition of rubber and rubberlike materials, in order to facilitate business in this country and internationally. He cited the problems of domestic and international shipments of materials where classification for transportation and tariff purposes as "rubber or rubberlike" of many new materials was badly needed. Examples of efforts of the U. S. Tariff Commission and the Bureau of Census of the U. S. Department of Commerce to classify rubbers were given.

It was voted to establish a task group which will use the outline in ASTM D 1418-56T, Class I—Elastomers as a base for surveying at least 25 leading rubber technologists to get their opinions regarding the materials to be classified under Class I—Elastomers; Class I A—Vulcanizable Elastomers; Class IA1—Vulcanizable Elastomers, Diene Rubbers; Class IA2—Vulcanizable Elastomers, Non-Diene Rubbers; and Class IB—Nonvulcanizable and Other Elastomers. Materials shall be identified by both chemical composition and/or trade names and definitions for these classes and subclasses shall be developed, if possible. Members of the task group consist of H. G. Bimmerman, Du Pont, chairman; I. D. Patterson, Goodyear; H. Tannenberg, Goodrich; and G. C. Maassen, R. T. Vanderbilt Co.

Subcommittee 9—Insulating Tape. C. W. Pickells, Consolidated Edison Co. of New York, chairman. A proposal to change the method of measuring the thickness of rubber insulating tapes and a proposal for the establishment of limits for deviation of individual measurements of width and thickness, in addition to the present limits for average deviation of five measurements, will be submitted to letter ballot in the subcommittee.

It was dcided that the ozone resistance requirements in D 1373, Specifications for Ozone Resistant Rubber Insulating Tape, are adequate for the intended usage of such tape. The specification section was instructed, however, to prepare a new specification for insulating tape made of butyl rubber. It is expected that such tape which will be used with butyl rubber insulated cables will have greater ozone resistance requirements than those in D 1373, as well as greater requirements for certain other physical properties.

A task group was appointed to consider the desirability of writing a new specification for tapes used with the new moisture and heat resistant cable insulations now available.

Subcommittee 10—Physical Tests. L. V. Cooper, Firestone, chairman. Work on the standardization of tension testing machines is being started in subcommittee 1 of Committee E-1 on Methods of Testing, with D. C. Scott of Scott Testers, Inc., as chairman of the task group. Other members of this task group are as follows: R. E. Green, Thwing-Albert Instrument Co.; W. F. Bachelder, Testing Machines, Inc.; H. L. Fry, Bethlehem Stel Co., Inc.; J. K. Frederick, Jr., Lowell Technological Institute; W. J. Holley, Goodyear Tire & Rubber Co.; W. C. Aber, Aluminum Company of America; B. L. Lewis, Tinius Olsen Testing Machine Co.; and H. F. Schiefer, NBS.

At the last meeting of subcommittee 10 it was recommended that D 1414 be discontinued and the necessary changes in D 412, Method of Tension Testing

of Vulcanized Rubber, be made to include the proper method of testing "O" rings. As a result of complaints from suppliers and users of "O" rings regarding the above action, the chairman of subcommittee 10 asked **D. S. Messenger, Garlock Packing Co.,** to review the matter with the members of the original committe responsible for D 1414. Two serious negative votes were recorded and these dissenters not only wish D 1414 to be continued but recommended that it be expanded.

The subcommittee voted to rescind its previous recommendation and to do more work on D 1414.

The chairman asked for comments on new developments or the need for investigation of other phases of D 412 but no further action was requested.

Subcommittee 11—Chemical Tests. W. P. Tyler, B. F. Goodrich Co. Research Center, chairman. The report of the task group on the determination of zinc indicated that the second testing program has clearly shown the way to proceed for a final evaluation of the spectophotometric method.

The task group on the analysis of rubber chemicals submitted a revised solubility method for examination by the subcommittee. Progress was reported in choosing a method for the determination of benzothiazyl disulfide (MBTS). A method for the determination of fineness is also being studied.

Encouraging results were reported on the U. S. Rubber Co. method for the determination of sulfur in rubber by the high temperature combustion method. Three methods for sulfur look worthy of serious consideration as alternate ASTM methods.

Committee D-13 on Textile Materials has requested a method of analysis for the rubber content of rubber coated or impregnated cord and a task group will be appointed to work on such a method.

A preliminary report was given on changes needed in D 833-46T, Methods of Identification and Quantitative Analysis of Synthetic Elastomers, and a task group will recommend editorial additions and deletions where no testing program is required.

Changes in the method for the determination of copper in rubber will be proposed to bring the method in agreement with the ISO/TC 45 method, retaining the present ASTM Method as an alternate method.

Subcommittee 12—Crude Natural Rubber. N. Bekkedahl, NBS, chairman. It was reported that D 1278, Tentative Methods for Chemical Analysis of Natural Rubber, had been approved with no negative votes in the Committee D-11 letter ballot and would therefore become a tentative standard.

In view of the possible need for a method for the determination of the nitrogen content of natural rubber as an indication of the presence of excessive amounts of organic non-rubber material, the subcommittee voted to ask ISO/TC 45 to include the determination of nitrogen in natural rubber on its agenda. Meanwhile, ASTM has an acceptable method for nitrogen in D 297, Methods for the Chemical Analysis of Rubber Products.

L. G. Mason, Goodrich, head of the task group on methods of test and specifications for natural rubber, reported that a fairly good correlation has been found between the amounts of harmful metals in rubber, such as copper and manganese, and the results of the infrared heating test. Work on this project will be continued in an attempt to develop a suitable rapid test method of the deterioration of natural rubber.

Subcommittee 12 was fortunate in having a direct representative of the natural rubber producing industry at the Boston meeting, G. W. Drake, Rubber Research Institute of Malaya, from whom the subcommittee obtained much valuable information that could only be obtained from someone with experience in the plantation industry.

Subcommittee 13—Synthetic Elastomers. B. S. Garvey, Jr., Pennsalt Chemicals Corp., chairman. Mr. Mason reported that D 1485-57T, Sampling and Sample Preparation of Synthetic Elastomers, seems equally applicable to SBR oil and black masterbatches, and it was voted to make the necessary editorial changes in D 1485, after circulating these changes within subcommittee 13.

B. C. Pryor, Goodrich-Gulf Chemicals, Inc., head of the section on chemical tests, reported that the D-11 letter ballot on the determination of mixed alkylated phenols in SBR, in D 1416-58T, Chemical Analysis of Synthetic Elastomers, received two negative votes. These negative votes were resolved by editorial changes and will be reviewed by Mr. Pryor, W. P. Tyler, Goodrich; and J. I. Black, Shell Chemical, before publication.

Mr. Pryor's section is obtaining data on the determination of oil content and total extract in oil masterbatches, and is considering methods for the determination of antioxidants in oil masterbatches, oil in oil-black masterbatches, and color tests.

A report on the work of the section on physical tests headed by W. G. Orr, Texas-U. S. Chemical Co., was given by H. R. Norsworthy of the same company. Results of a survey on compound recipes now being used for testing SBR revealed that approximately the same recipe is being used by all producers for hot SBR and cold SBR 1500. Two basic recipes are in use for testing cold non-staining SBR and seven recipes are in use for oil masterbatches. The majority of producers are willing to consider HAF black in place of EPC black in test recipes. After much discussion, which included a suggestion that pure gum SBR test recipes be considered, the section was asked to obtain data on the comparison of 40 parts of EPC black *vs.* 50 parts of HAF black in a SBR 1712 mix containing 5 parts of zinc oxide, 2 parts of sulfur, and 2 parts of MBTS.

The majority of SBR producers were opposed to the use of mixing the test recipes in a laboratory Banbury instead of on a two-roll mill, mostly because of lack of a laboratory Banbury for control use.

It was voted to add the word "paraffin" and the abbreviation "PAR" to Table 2 in D 1419-58T, Recommended Practice for Description of Types of Styrene-Butadiene Rubbers, as a term to be used for the description of paraffinic oils used in oil masterbatches. This action will be letter balloted in Committee D-11.

Mr. Seaman pointed out that some SBR producers have publicized numbers for various grades of SBR that are not in accordance with D 1419-56T. In the discussion which followed it developed that in some cases the use of these numbers was inadvertent and was being corrected. Firestone Tire & Rubber Co. stated, however, that it does not intend to follow the D 1419 system and recommended that it be abandoned. Representatives of the other SBR producers indicated that their companies were planning to continue to follow the D 1419 system.

Mr. Seaman also suggested that, for convenience in listing of available SBR so-called experimental rubbers, subcommittee 13 be notified by the producers of experimental numbers as they are assigned. No action was taken on this suggestion.

Subcommittee 14—Abrasion Tests. R. F. Tener, NBS, chairman. A proposed revision of D 394-47, Methods of Test for Abrasion Resistance of Rubber Compounds, will be submitted for letter ballot in Committee D-11.

A Proposed Tentative Standard for Determining the Abrasion Resistance of Rubber Heels and Soles, after changing the procedure for evaluation of the standard compound, will be submitted for letter ballot in Committee D-11 also.

Subcommittee 15—Life Tests for Rubber Products. G. C. Maassen, R. T. Vanderbilt Co., chairman. The chairman reported that the papers presented at the Ozone Symposium held in St. Louis, Mo., February 1958, have been forwarded to ASTM headquarters and will be published in the near future.

A report from A. G. Veith, B. F. Goodrich Research Center, head of the task group on ozone aging, was read by the subcommittee chairman and dealt with a review of D 1149-55T, Method of Test for Accelerated Ozone Cracking of Vulcanized Rubber, and the work being done in checking methods of analysis, chamber shapes and sizes, and countercurrent airflow.

J. E. Norton, Atlas Electric Devices

Co., chairman of the task group on calibration of light sources, reported that work on a plastic chip method of calibration to replace analysis by oxalic acid is underway, and that results may be expected in about one year.

G. N. Vacca, Bell Telephone Laboratories, chairman of the task group on aging of vinyl and highly plasticized elastomers, reported that samples of vinyl insulated wire and molded sheets have to be submitted to several laboratories for oven aging. Mr. Rosch will evaluate and correlate all tests in this phase of the program. Tests in connection with air turbulence, amount of air, volatile content of air, temperature uniformity in ovens, oven size, location of samples within the oven, and geometry of samples will not be undertaken until the first part of the program is completed.

With regard to stationary *versus* rotating shelves within the ovens and the degree of closure of oven ports during aging, Dr. Stiehler pointed out that Appendix 2 of the 1958 D-11 standard on ovens contains a proposed specification for control of temperature and ventilation in air ovens.

The subcommittee chairman reported that ISO/TC 45 wishes to conduct a round robin test on light aging using Xenon lamps, which are produced in Germany. Mr. Norton stated that Atlas Electric Devices has converted two machines to an Xenon light source and has a German made machine. He offered to cooperate in a testing program.

It was voted to delete footnote 4 from D 925-55, Methods of Test for Contact and Migration Stain of Vulcanized Rubber in Contact with Organic Finishes, since the J. H. Eastman Sunlamp S-91 is no longer available.

Subcommittee 16—Description and Classification of Rubber Compounds. J. F. Kerscher, Goodyear, chairman. The American vote on ISO/TC 45 proposals in Documents 398 and 400 was a dissenting one on the basis of the following reasons (as quoted from a letter from Dr. Stiehler to Mr. Frost of the ASA):

(1) Documents 398 and 400 are in the form of reports of Working Group 6 of ISO/TC 45 rather than proposals of the Committee and a large amount of redundant material is included.

(2) The proposed specifications of properties is meaningless since there are no specific references to methods of test.

(3) Two systems, one alphabetical and the other numerical, are proposed for coding the properties and this will cause confusion.

(4) Document 400 is redundant since the graduation of properties is included in Document 398.

(5) These proposals should be combined into an ISO/TC 45 proposal for a system classifying and coding the properties of vulcanized rubber. Specifications must necessarily be restricted to rubber compounds that can be made commercially and should not be included in this ISO/TC 45 proposal. The subject of specifications is scheduled to be discussed for the first time at the next meeting of ISO/TC 45.

T. M. Loring, Chicago Rawhide Manufacturing Co., head of ASTM-SAE Tech. A. section IVd task group assigned to develop a new classification system for rubber compounds involving an expansion of ASTM D 735, Specifications for Elastomer Compounds for Automotive Applications, explained the proposed tabular system, with the assistance of Neil Catton, Du Pont, chairman of section IVd of Tech. A.

Subcommittee 17—Hardness, Set and Creep. S. R. Doner, Raybestos-Manhattan, Inc., chairman. A negative vote in the latest Committee D-11 letter ballot in connection with the advancement of D314-52T, Method of Test for Hardness of Rubber, to standard was overruled. The vote objected to making D 314 a standard method because of its limited use.

W. A. Frye, Inland Manufacturing Division, General Motors Corp., submitted the final report on the interlaboratory hardness test program which now includes the results of the statistical analysis of the data obtained. The correlation between several hardness meters, their interchangability, accuracy of conversion, and reproducibility within laboratories and between laboratories were summarized.

As a result of a questionnaire circulated within subcommittee 17, R. S. Havenhill, St. Joseph Lead Co., was asked to write instructions for conditioning the durometer for testing at low temperatures for inclusion in D 676, Method of Test for Indentation of Rubber by Means of a Durometer.

The reasons for allowing the use of plied-up specimens for compression set testing was explained by A. E. Juve, B. F. Goodrich Research Center, and it was decided that no change should be made in this method.

D 395, Method of Test for Compression Set of Vulcanized Rubber, does not apply to compounds with a hardness greater than 85. It has been found impractical to deflect compounds with a hardness of 90 or more, the 20% as required by D 395. Subcommittee 17 decided to ask for guidance from the advisory committee of D-11 on the following points: (1) Should subcommittee 17 consider work in this hardness range or does it more properly belong in the hard rubber subcommittee or the plastics committee? (2) It is necessary or advisable to attempt to test for compression set in this hardness range?

The American delegation to ISO/TC 45 registered a negative vote on the ISO method for compression set because subcommittee 17 did not agree that the specimens should be lubricated with silicone oil before assembly in the test fixture. In order to obtain data to support or withdraw this vote subcommittee 17 objection, a task group headed by Ross Shearer, Goodrich Research Center, plus representatives from Gates Rubber Co., Garlock Packing Co., Navy Dept. Bureau of Ships, and Raybestos-Manhattan, Inc., was formed. The task group will determine the effect of this lubricant as compared with no lubricant when making compression set measurements using the present ASTM method. A comparison of molded *versus* cut compression set specimens will also be made, to determine if molded specimens should be allowed in D395.

It was voted to include in D 676, Figure 7 from the article on hardness testing by A. E. Juve in the April-June 1957 issue of *Rubber Chemistry and Technology*, since this graph will help to explain the minor differences in hardness values obtained when Shore A durometers with .093 and .100 of an inch pin extensions are used.

Subcommittee 1—Tests for Properties of Rubber and Rubberlike Materials in Liquids. F. H. Fritz, DuPont, acting chairman. A letter ballot will be circulated in the subcommittee to determine whether or not a new synthetic oil reference fuel should be included in D 471, Method of Test for Change in Properties of Elastomeric Vulcanizates Resulting from Immersion in Liquids, in view of the increasing use of such materials by the aircraft industry.

Upon receipt of approval from section IVh of Tech. A., the addition of reference fuel C (50% by volume isooctane and 50% toluene) as a means of characterizing present day aromatic gasolines, to D 471, will be submitted to letter ballot in the subcommittee.

It was also decided to letter ballot the subcommittee on editorial changes in D 471 that would call for more careful handling techniques of the immersed specimens for the purpose of improving reproducibility.

It will be recommended to Committee D-11 that a report of a task group which shows the adequacy of D 471 at test temperatures of 300° F. be published in the ASTM Bulletin and elsewhere, following approval from section IVh of Tech. A., cosponsors with the subcommittee 17 task group in this work.

The above mentioned task group will also begin the investigation of fluid immersion tests at temperatures between 400 and 600° F., taking into consideration the type of test fluids that could be expected to produce meaningful results at such high temperatures.

Subcommittee 20—Adhesion Tests H. H. Irvin, Marbon Chemical Div., Borg-Warner Corp., chairman. A study of the possibility of enlarging the scope of D 429-56T, Methods of Test for the Adhesion of Vulcanized Rubber To Metal, to include testing of samples exposed to various environmental conditions, was assigned to a task group headed by P. J. Larsen, Lord Mfg. Co.;

with Henry Peters, Bell Telephone Laboratories; and Hugh Macey, Goodrich Research Center, as members.

John Anderson, Goodrich, was appointed as a representative of subcommittee 20 to section IVw of Tech. A. to follow the joint program of subcommittee 20 and section IVw on developing actual specifications from the results such as those of the above mentioned task group.

The scope of subcommittee 20 is to be reviewed by the D-11 advisory committee in connection with the sponsorship of D 413-39, Methods of Test for the Adhesion of Vulcanized Rubber To Metal (Friction Test).

Subcommittee 21—Rubber Cements. J. F. Anderson, Goodrich, chairman. An ultrasonic method of non-destructive testing of adhesive bonds is submitted for letter ballot in Committee D-11 for possible addition to D 1205-53T, Method of Testing Adhesives for Brake Lining and Other Friction Materials.

Further work on the disk shear test in D 1205 will be held in abeyance until the progress of Tech. A. on this project is determined.

C. P. Lupton, Bendix Aviation Corp., will report at the next meeting on a tension test for measuring bond strength between friction material and metal, which test uses a one sq. in. "shoe" bonded to the friction material and separated in tension.

The subcommittee was again asked to develop a rapid method for the determination of the total solids of liquid adhesives. It was reported that Central Scientific Co. is designing an apparatus for this purpose.

Subcommittee 21 was also asked to consider the development of a standard coated fabric for use in testing seam adhesives (used in inflatable products) and efforts in this connection will be correlated with those of Committee D-14 on Adhesives.

Subcommittee 21 will organize a special section for the study of (tire) cord adhesion and for the development of a standard test method for measuring the adhesion betwen textile and metallic cords and elastomers.

Subcommittee 22—Cellular Rubber. H. G. Bimmerman, Du Pont, chairman. The tentative methods of test and specifications for closed cell polyvinyl chloride sponge were discussed with A. F. Sereque, Goodrich, with special reference to the absence or presence of skin on the sponge and its effect on the various tests. It was decided to submit these tentative test methods and specifications to letter ballot in Committee D-11 with the tolerances as a part of the specifications since this latter is consistent with D 1055, Specifications and Methods of Test for Latex Foam Rubbers; and D 1056, Specifications and Methods of Test for Sponge and Expanded Cellular Rubber Products.

The proposed tentative specifications and methods of test for open cell vinyl foam and for urethane foam rubber as approved by the recent D-11 letter ballot require the correction of certain typographical and editorial errors before final publication. Also, values for the table of physical requirements for urethane foams are being prepared by the Society for the Plastics Industry, Inc.

The task group headed by R. H. Taylor, Scott Testers, Inc., reported that in general, manufacturers and consumers of foam rubber were satisfied with the results obtained with the various foam indentation testers in use and subcommitte 22, therefore, plans no further work in this field.

C. S. Yoran, Brown Rubber Co., has resigned from subcommittee 22 for business reasons.

Subcommittee 23—Hard Rubber. W. J. Dermody, Electric Storage Battery Co., chairman. Members of the subcommittee will be polled by mail prior to the next meeting wifh regard to specific changes desired in D 530, Methods of Testing Hard Rubber Products, in order to develop a program for clarifying D 530 without loss of effectiveness.

Task force 7 headed by G. Lucas, and including W. R. Clingenpeel, Electric Autolite Co.; and H. Sherwood, will undertake the revision of D 639, Method of Testing Asphalt Composition Battery Containers.

Task force 1 on impact testing headed by J. R. Smyth, Electric Storage Battery Co., reported that specimen aging invalidated the results of the first round robin test program on impact testing. A second round robin test program is planned for October and will include a rupture penetration test using a spherical loading nose.

Task force 4 on hard rubber grades and classification headed by Henry Peters, Bell Laboratories, presented a tentative classification system. A proposal for subcommitee action is expected before February.

A tentative method of test for water absorption of hard rubber for inclusion in D 530 submitted by D. E. Jones, American Hard Rubber Co., head of task force 5, will be letter balloted in the subcommittee.

R. J. Wentland, Richardson Co., subcommittee 23 liaison with Committee D-20, reported that action by the plastic committee on D 1484, Method of Test for Penetration of Hard Rubber by Type D Durometer, is still pending.

Subcommittee 24—Tests for Coated Fabrics. K. L. Keene. U. S. Rubber Co., chairman. G. W. Goodson, Sperry Gyroscope Co., reviewed his work with two falling weight methods of determining the cold crack resistance of coated fabrics. The chairman of subcommittee 24 will request that subcommittee 25 study the various methods used for determining cold crack resistance of coated fabrics and recommends a method for use by subcommittee 24.

W. H. Bryan, DuPont, reported on a comparison of 2 *vs.* 12 inches per minute jaw speed separation for adhesion testing which indicated so mucn variation in results between laboratories that no conclusions could be drawn. This investigation will be continued, however.

The problem of abrasion testing of coated fabrics will be referred to the D-11 liaison representative on research as an unsolved problem of subcommittee 24.

The problem of tensile tests on silicone coated fabrics was resubmitted by Mr. Bryan but due to lack of interest by other members of the subcommittee no action was taken.

The subcommittee chairman was authorized to consult with ASTM headquarters with regard to assistance in interesting large consumer groups, such as the automotive industry, in actively participating in the work of subcommittee 24.

Subcommittee 25—Low Temperature Tests. R. S. Havenhill, St. Joseph Lead Co., chairman. Dr. Stiehler reported on low temperature hardness tests with the ISO Wallace deadweight instrument, and distributed copies of compliance curves which appear to be very similar to results obtained with stiffness testers such as the Gehman apparatus.

The negative vote on the latest D-11 letter ballot on D 746, Method of Test for Brittleness Temperature of Plastics and Elastomers by Impact, was resolved, and it was recommended that the ISO/TC 45 method be brought into agreement as to specimen size with the ASTM method.

R. G. Dunlop, Smithers Laboratories, and Z. T. Ossefort, Rock Island Arsenal, reported that the checks on the speed of the Scott Testers solenoid impact test apparatus by the modified impact ball thrust method, agreed with those obtained with the Berkeley counter. It was recommended that a round robin test program be set up to determine the speed of the Scott Tester solenoid machines now in use. The chairman will contact those interested in this test program.

Mr. Goodson reported the results of the Aeronautical Material Specification (AMS) brittleness round robin test program and described their novel gravity-operated tester with ballistic galvanometer velocity checking equipment. It was decided that the chairman of subcommittee 25 should contact Committee D-20 in connection with a revision of D 746, to include other types of activation for the impact tester, such as gravity and spring-operated instruments, provided these latter meet the specified velocity requirements.

Irving Kahn, Watertown Arsenal, reported on the work being carried on in ISO/TC 45 on low temperature testing and recommended that instruments

other than solenoid or motor driven be given further consideration for brittleness testing.

Subcommittee 26—Processibility. R. H. Taylor, Scott Testers, Inc., chairman. T. Wolczynski, U. S. Rubber, chairman of task group 1 on Mooney viscometer rotors, reported by letter as follows: (1) The 48 grooved rotors are essentially equivalent to the standard serrated rotor. (2) No further work should be done on this problem at this time, however, because the 48 grooved rotor is more expensive to manufacture and may wear out more rapidly than the standard rotor.

The subcommitee chairman pointed out that while the 48 grooved rotor is more expensive to manufacture than the standard serrated rotor, it would wear longer, but the difficulty in knowing when wear became excessive would still be a problem. The subcommittee voted to discontinue consideration of rotors at this time and discharged the task group with thanks.

Ross Shearer, chairman of task group 2. appointed to revise and combine D 927-57T, Method of Test for Viscosity of Rubber and Rubberlike Materials by the Shearing Disk Viscometer, and D 1077-55T. Method of Test for Curing Characteristics of Vulcanizable Rubber Mixtures During Heating by the Shearing Disk Viscometer, asked for clarification by subcommittee 26 of limits to be specified for temperature control, the retention of the section specifying run out of the rotor, and retention of the typical cure and temperature-time curves shown in D 1077. The subcommittee agreed to specifying $\pm 1°$ F., the deletion of the section specifying run out of the rotor, and to retention of the typical curves.

The task group headed by J. Sweely, Sun Oil Co., to consider additional methods of evaluating processibility, has completed its assignment and was discharged with thanks.

J. F. Kerscher, chairman of task group 4, appointed to investigate the standardization of extrusion test dies and methods, reported that returns from a questionnaire indicate that the greatest interest appears to be in the Garvey die and in a circular die.

F. J. Sackfield, American Synthetic Rubber Corp., chairman of task group 5 on shrinkage tests, reported that methods are being considered for polymers having less than 25% shrinkage and also for polymers having more than 25% shrinkage. The first method involves a test of the uncompounded polymer and the second, a test on a compounded polymer. Subcommittee 26 recommended that for the compounded polymer test, one of the test recipes in D 15-55T, Methods of Sample Preparation for Physical Testing of Rubber Products, be selected. Both methods will be checked by means of a cross test within the task group.

R. D. Stiehler made the following comments on the Kanavets Shear Plastomer reported at the last meeting of ISO/TC 45 by Russian delegates. This plastomer appears to have merit, but the translation of the published material on it was not sufficiently clear to permit definite conclusions. The subcommittee chairman appointed a task group headed by A. E. Juve, and including B. S. Garvey, Jr., and Dr. Stiehler, to determine whether the information concerning this unit was worthy of republication in this country, and whether permission to republish the information could be obtained.

Subcommittee 27—Resilience. W. A. Frye, Inland Mfg. Div., General Motors Corp., chairman. The results of a questionnaire circulated to determine the extent of use of resilience tests by the rubber industry were presented.

The effects of pen pressure and platen adjustment on Yerzley resilience results will be determined and studied at the next meeting.

It was voted to letter ballot the subcommittee on a proposal of A. E. Juve to compute resilience in D 945-55, Methods of Test for Mechanical Properties of Elastomeric Vulcanizates Under Compressive or Shear Strains by the Mechanical Oscillograph, by using the average resilience computed from the second, third, fourth, and fifth halfcycles.

A description of the Pirelli microrebound tester was circulated among the members and guests present.

An attempt will be made to stimulate interest in the standardization of forced vibration methods for the determination of resilience of elastomers.

Subcommittee 29—Compounding Ingredients. A. E. Juve, B. F. Goodrich Research Center, chairman. G. C. Maassen, head of the task group of the possible revision and/or subdivision of D 15-55T, recommended a rearrangement of the sections of D 15-55T, and incorporation of the carbon black method D 1522, as follows:

Section 1 to include the references to standard materials, equipment for mixing, and the present parts B and C.

Section 2 to include the standard formulas.

Section 3 to include all portions of D 15 dealing with the evaluation of SBR.

Section 4 to include the material in D 1522 on testing carbon blacks in rubber.

The task group will rewrite D 15-55T along the above lines and will submit their proposal to subcommittee 29 at its next meeting.

Several new SBRs will be added to the SBR standard formula table since there were no negative votes on this proposal in the recent D-11 letter ballot.

Since the procedures in D 1522 for testing carbon blacks in rubber is already being widely used by both producers and consumers of carbon blacks, it was proposed that a task group be formed for the purposes of: (1) Accumulating data obtained on the various grades of carbon black by use of this procedure in order to determine the range of properties which result. (2) To consider whether the present mixing procedures which are the same for all grades of black are preferable to a series of mixing procedures which will vary with the particle size of the black being used.

SAE-ASTM Technical Committee A

H. Tannenberg, secretary of the SAE-ASTM Technical Committee on Automotive Rubber gave a brief report of the activities of this committee, at the D-11 Committee meeting. A more detailed report of the June 3, 4 meeting of this committee as supplied by the Society of Automotive Engineers from material assembled by J. M. Ball, Midwest Rubber Reclaiming Co., is as follows:

ISO/TC 45 Proposal. In addition to the negative vote of the Technical Committee at its March meeting on ISO/TC 45, documents 398 and 400 dealing with proposals for classifying and grading vulcanized rubber, Tech A. has forwarded appropriate letters to ASTM and SAE requesting a negative vote by the American delegate to ISO/TC 45, because the proposals in documents 398 and 400 permit impossible combinations, and for other reasons expressed previously by Technical Committee A.

Cellular Rubber. Substantial approval except for minor editorial changes, has been obtained for the latest revised specifications for vinyl and urethane foams. A specification for closed cell vinyl foam is being discussed also.

Revision of Tables. J. P. Munn, Du Pont, reported that there was sufficient interest in the development of a table of chlorosulfonated polyethylene (Hypalon) compounds and he will head up a task group for this purpose.

H. H. Anderson, General Tire, reported that there is a sharp difference of opinion in the industry regarding the commercial status of urethane rubbers, that is, some people want to proceed immediately with the preparation of a classification and table, while others feel that these rubbers are still in the experimental stage. It is unlikely that it will be possible to develop a table on urethane rubbers before 1960, but Mr. Anderson was requested to keep his section active and accumulate data and information for the preparation of a table at a later date.

In view of the response to the questionnaire on fluororubbers D. S. Messenger, Garlock Packing, will proceed with the development of a classification and table for such materials.

Compression Set. W. H. King, Acushnet Process, recommended the adoption of a 22 hour time interval at 212° F. for determination of compression set to replace the present 70 hour time interval, for Table III, Type S, Class SB; and Table IV, Type S, Class SC compounds in D 735-57T. The shorter test time gives compression set values approximately two-thirds those obtained using the 70 hour test period. No data have been obtained on hardnesses of Shore 30 and 90 compounds, but these values will be established. This recommended change will be letter balloted.

The work of this section on relaxed compression set has been completed but the data have not yet been analyzed.

Impact Testing. Several sketches of proposed test equipment were submitted by members of this section which is headed by R. P. Schmuckal, Ford Motor Co., which were intended to emphasize simplicity of design and low cost of manufacture of impact testing apparatus. Copies of the sketches, together with discussion, will be circulated for comments. It appears that a test specimen about the size of the Yerzley compression button will be suitable.

Expanded Tabular System. Since the March meeting, T. M. Loring, Chicago Rawhide, chairman of the subsection assigned to develop an expanded tabular system for vulcanized rubber compounds in the form of a single master specification, has met with his group to consider the problem of adding new elastomers to the proposed expanded tabular format. In this work the interests of SAE's Aeronautical Material Specifications (AMS) are represented by D. E. Manning, Pratt & Whitney, and the interests of the Department of Defense are represented by Arthur Jones, Watertown Arsenal. The most important immediate considerations are values for resistance to dry heat and oil, and the details are to be worked out in such a way as to coordinate with the rubber specifications program of the Defense Department.

Arrangements are being made to present a paper on the proposed expanded tabular system of specification writing before the International Rubber Conference in Washington, D. C., in November 1959.

Fluid Aging. B. H. Capen, Tyer Rubber, reported on the program for testing the effect of highly aromatic gasolines on rubber products, which program involved four compounds, three gasolines, and was participated in by four companies. Hardness, tensile properties and volume changes were determined before and after immersion for 70 hours at room temperature. In general, loss of tensile properties following immersion increases as the aromatic content of the gasoline increases.

It was recommended that a test fuel composed of 50% by volume of isooctane and 50% toluene be adopted as representative of the swelling characteristics of the super-premium gasolines now on the market, and that this test fluid be adopted as ASTM reference fuel C.

B. Vandermar, Acadia Synthetic Products, head of the section on gear lubricants, after a review of the test results which had been obtained with these materials, reported that his section would need to do further work before definite conclusions could be drawn. A questionnaire will be circulated to determine the testing times and temperatures required. The testing of transmission fluids will be deferred until the study of gear lubricants has been concluded.

Tear Testing. The section on tear testing, headed by Mr. Tannenberg, reviewed data on natural rubber and SBR commercial stocks of various hardnesses and decided that the tear strength values were representative of these stocks but that the values should not be incorporated in the D 735 tables but placed on record as a matter of interest. This decision will be letter balloted.

Tear strength data on butyl, neoprene, nitrile, silicone, methacrylate and Thiokol polysulfide rubbers will be solicited from members of Tech. A.

Static Exposure Testing. Maurice Lowman, Goodyear, head of the section on ozone testing, reported that results of a recent round robin test program showed a higher degree of cracking than had been reported from previous work of this type, i.e., with Neoprene Type W compounds. The specimens had been prepared and cured two months prior to testing, and the reduced resistance to ozone cracking was considered to be due to crystallization of the Type W Neoprene.

The test procedure for these samples will now include a heating period of one hour at 158° F., and they will then be allowed to rest for 24 hours at room temperature before they are mounted on the mandrels.

A paper on ozone testing is to be prepared by Mr. Lowman and H. P. Miller, B. F. Goodrich, for presentation before the 1959 Washington International Rubber Conference.

Rubber-to-Metal Adhesion. It was agreed that the spread between the results obtained by different laboratories in the latest round robin test program for rubber-to-metal adhesion was too great to provide representative test values. The test method will be reexamined to try to find means of improving reproducibility of results.

Hose. This section headed by C. P. Mullen, Gates Rubber, has prepared a proposed ASTM test method and SAE specification for fuel, oil line, hydraulic and refrigerant hose. Letter ballots on both the ASTM and SAE proposals have been circulated and the negative ballots resolved, so that the matter is now ready for consideration by D-11 and Tech. A.

The subsection on power steering hose and assemblies has not finalized the engineering data which has been prepared, but they will be expedited.

Automotive Gaskets. M. H. Kapps, F. D. Farnum Co., desires to consolidate gasketing specifications into a minimum number of documents and this objective is favored by the officers of ASTM Committee D-11. The section will expand its scope accordingly and obtain approval from the officers of Tech. A.

Low Temperature Properties. In order to obtain an opinion of the data now available on the solenoid machines, E. R. Cole, B. F. Goodrich, chairman of this section on low temperature properties of elastomers, will consolidate and summarize the work and circulate a letter ballot in his section recommending the adoption of ASTM D 746-55T, Method of Test of Brittleness Temperature of Plastics and Elastomers, Method B, as the method of test for low temperature brittleness in place of the present D 736-54T, Method of Test for Low Temperature Brittleness of Rubber and Rubberlike Materials.

The section has been asked to determine whether or not a low temperature stiffness test designation in D 735 is needed. The military services have adopted a modified version of D 1053-54T, Method of Measuring Low Temperature Stiffening of Rubber and Rubberlike Materials by the Gehman Torsional Apparatus. Rock Island Arsenal will be asked to give the background on this proposed change.

WRG Annual Outing

The Washington Rubber Group held its annual outing at Bethesda Country Club, Bethesda, Md., on June 27 with 120 members and guests in attendance. The committee for the event consisted of the following personnel: chairman, Thomas A. Tharp, General Tire & Rubber Co.; tickets, Daniel Pratt, Navy Bureau of Ships; golf, W. James Sears, Rubber Manufacturers Association; prizes, John J. Egan, International B. F. Goodrich Co., and Charles R. Collins, B. F. Goodrich Co. Golf, swimming, etc., preceded dinner and dancing.

The winners of the golf tournament were as follows: low net, WRG trophy, Leland E. Spencer, Goodyear Tire Co. of Canada, Ltd.; runner up low net, Belko trophy, Richard E. Vernor; low gross, Soctex trophy, John W. Powless, Carlisle Tire & Rubber Co., runner up low gross, Leland E. Spencer; ladies low net, Mrs. W. J. Sears; ladies runner up low net, Mrs. Marjorie Rice; and ladies low gross, Mrs. L. E. Spencer.

Sales Management, Industry Problems Feature RMA Subdivision Meeting

The Molded, Extruded, Lathe Cut, and Sponge Rubber Products Subdivision of The Rubber Manufacturers Association, Inc., held its annual meeting at the Hotel Astor, New York, N. Y., June 17. The program for the morning session was in the form of a panel discussion and called a "Sales Management Clinic." The afternoon program had as its subject, "Industry Problems and Opportunities," and featured guest speakers as well as speakers from the Association staff.

James Goss, vice president of consumer products, General Electric Co., was the luncheon speaker. He discussed "Management's Responsibilities in the Control of Expenses."

W. J. Blizzard, Firestone Industrial Products Co., chairman of the RMA Subdivision, presided and was assisted by C. H. Hardy, RMA Mechanical Goods Division secretary.

"Sales Management Clinic"

There were five panels comprising the sales management program. Questionnaires were circulated by each of these panels, and their reports were based on the answers. A detailed tabulation of the replies is not available at this time, but is expected to become available for publication at a later date.

"Field Salesmen's Reports to Management" was the subject of discussion by the first panel, consisting of K. N. Carter, vice president of sales, H. O. Canfield Co. of Virginia, as moderator; with panel members M. J. Katis, vice president and general manager, Dryden Rubber Division, Sheller Mfg. Corp.; E. F. Doe, sales manager, Pawling Rubber Co.; and David Lewis, vice president of manufacturing and sales, Vulcanized Rubber & Plastics Co.

Mr. Carter first commented on the reluctance of salesmen to report and the desire of management to have detailed reports of field salesmen's trips. Mr. Katis emphasized that route sheets are important and are used generally for improved organization of field salesmen's work.

Mr. Doe stated that about half of the companies replying to the questionnaire indicated that daily call reports were required. Reports varied from a mere listing of the calls made to details of each call. Daily call reports were considered to be important as a means of checking proper organization of travel expense, for recording customer complaints, and for obtaining requests for quotations.

Weekly and monthly conferences between salesmen and their management were used in addition to the daily call reports, and the importance of a monthly report, as compared with daily or weekly reports, was also emphasized.

Mr. Lewis stated that some companies attached great significance to lost-order reports, but that requests for quotation forms were means of determining whether the order was obtained or lost. Salesmen's reports are generally routed through all departments of the company and then go to management, and these reports must therefore be accurate since they are a means of evaluating company performance.

It was mentioned that Ohio Rubber's customer complaint form includes a broad red border for easy identification.

"Management's Reports to Field Salesmen" was the subject discussed by the second panel. D. S. Watkins, vice president of sales, Chardon Rubber Co., was moderator for this panel, and the panel members were as follows: H. C. Sommer, director of sales, General Tire & Rubber Co., industrial products division; R. V. Yohe, vice president of sales, B. F. Goodrich Industrial Products Co.; and H. C. Dinmore, sales manager, Tyer Rubber Co., industrial products division.

Mr. Watkins first made the point that well-informed salesmen are good salesmen and represent their companies to best advantage. He then asked several questions of his panel members the first of which was whether salesmen were furnished detailed data from customers' orders or quotation requests. Mr. Yohe considered detailed information from customers necessary; Mr. Sommers felt it should not be too detailed. Mr. Dinmore said salesmen want blueprints of customer items, but that legible reproductions of customer blueprints present difficulties.

The majority of companies apparently supply their salesmen with daily information on shipments to customers.

Reports to salesmen of their position volumewise to other salesmen in the same company was not felt to be worthwhile since it was difficult to get meaningful comparisons.

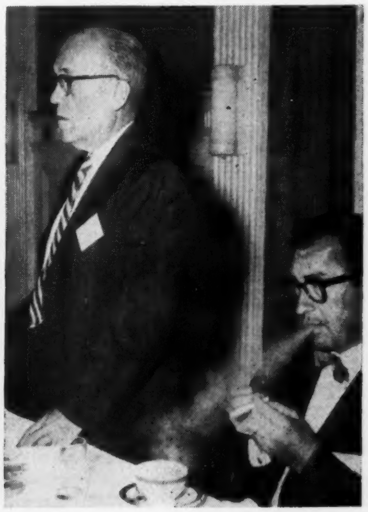
Most companies hold annual sales meetings, but large companies hold annual district meetings rather than meetings for the entire sales force. In the latter case about 25 salesmen from various districts are brought to the home office periodically for briefings on developments in their own and other areas.

Sales quotas were considered an essential part of proper sales management, except for certain special fields such as custom molding. Some companies make regular sales forecasts; some don't, but the latter may make arbitrary estimates.

"Sales Methods" was the subject of the third panel discussion. R. C. Kremer, vice president of general sales, Ohio Rubber Co., was the moderator for this panel, and the other members were as follows: R. H. Davis, sales manager, Cooper Tire & Rubber Co., industrial rubber products division; E. W. Wright, sales manager, molded and extruded goods, B. F. Goodrich Co.; and Anton Rizzardi, sales manager, Yale Rubber Co.

Mr. Kremer said the results of the industry questionnaire on this subject showed no definite pattern of sales methods used. Sales were made directly from plants, by field salesmen, by manufacturers agents, and other

James Goss, vice president, General Electric Co., luncheon speaker. K. N. Carter, H. O. Canfield; Pierce Sperry, Sperry Rubber & Plastics, on left



W. J. Blizzard, Firestone Industrial Products Co., subdivision chairman; C. H. Hardy, RMA mechanical goods division secretary, on right

means. He emphasized that sales methods cannot be static, but must be flexible under present-day conditions.

Mr. Rizzardi pointed out that the use of manufacturers' representatives was necessary when a company had very little national reputation, but this was the most costly sales method. Yale Rubber uses all available methods, but finds such procedure somewhat confusing. He added that Yale Rubber does not use one manufacturers' representative exclusively.

Mr. Wright declared that it was not possible to require manufacturers' representatives to make a given number of calls in the molded and extruded lines and that the frequency of calls was dependent on the potential of the account.

Mr. Davis pointed out that direct salesmen, manufacturers' representatives, etc. must cover the territory assigned to them on a periodic basis. It was indicated that most manufacturers' representatives had adequate technical know-how, but should be backed by the company's technical staff.

"Entertainment Expense" was covered by the fourth panel. The moderator for this was Pierce Sperry, president, Sperry Rubber & Plastics Co., and the panel members consisted of R. D. Smith, president, Firestone Industrial Products Co.; R. G. Cox, B. F. Goodrich Co.; and Eugene Caillet, molded and extruded products department, Goodyear Tire & Rubber Co.

Mr. Sperry was of the opinion that in the recent past entertainment expense by salesmen had become too great. Such expense becomes part of overhead and so lower prices are related to lower entertainment expense. Limiting such expense is difficult, however, since there are no hard-and-fast rules as to how often and to what extent various customers should be entertained. Most companies do not limit the number of times or the amount spent on a given customer; this attitude depends on the size of the account.

Mr. Cox said that entertainment expense should be budgeted and should be related to existing business conditions. Any reduction in entertainment, however, should not be so drastic as to be easily noticeable to the customer. Between 0.5 and 1.0% of the sales dollar was considered to be an average entertainment expense budget.

Two-thirds of the companies replying to the questionnaire send Christmas gifts costing between $5 and $25 to their customers, but many feel that this practice should be modified.

Control of salesmen's convention expense is variable, but the general opinion seems to be that this expense should be budgeted also.

"Other Controllable Expense" was the subject covered by the last panel. Its moderator was Mr. Blizzard, and the panel members included: H. M. Dyer, sales manager, Acushnet Process Co.; E. F. Callanan treasurer, Clevite Harris Products, Inc.; and T. D. Ernst, assistant manager, engineered rubber products, United States Rubber Co.

Control of telephone expense was reported as variable, with no regular plan evident among the companies questioned. Leased wires were used by some companies.

Receipts for hotel bills are not required by most companies of their salesmen. The point was made that too much can be spent trying to control expense, and the result may be a net loss instead of a net profit.

Mileage allowed salesmen driving their own cars is about 8¢ a mile. The advantages of leasing cars for salesmen's use instead of buying these cars was emphasized, since for less than $100 a month a car can be leased, with repairs and maintenance taken care of by the lessor.

J. D. Mahoney, Mobay Chemical Co.

"Management Responsibilities"

James Goss, General Electric's vice president of consumer products, the luncheon speaker, was introduced by K. N. Carter. In discussing "Management's Responsibilities in the Control of Expenses," Mr. Goss pointed out that most manufacturers were using increased production volume to cover rising costs. In addition, management has the added responsibility these days, he said, to operate as if the stockholders' money they were using were their own.

A recession matures management and much of today's management personnel has never experienced a depression in business and, therefore, is facing this type of situation for the first time. The key to expense control is to relocate inefficient producers and eliminate deadwood. An understaffed organization is more efficient than an overstaffed organization and management must continually ask itself if all of its personnel is necessary under present day conditions, Mr. Goss said in conclusion.

"Industry Problems"

Mr. Mahoney, the first speaker at the afternoon session on "Industry Problems and Opportunities," discussed urethane materials in the rubber industry. He first emphasized that in the urethane industry it was felt that with urethanes, the rubber industry was on the threshold of a new and enlarged concept of marketing. Urethane rubber, he said, does not make other rubbers obsolete but it does make obsolete the conventional design approach to mechanical parts for industrial equipment. In any place where metals are now being used in mechanical equipment to support working loads, subject to oscillating, torsional or impact stress, urethane rubber is a new candidate for the design engineer to think about.

It was pointed out that urethane rubber had the advantage of a combination of high hardness and high modulus of elasticity and, as such, can fill a gap in the material specification charts and open up a whole new area for the rubber industry. In addition, urethane rubber parts are cast from a thin, free-flowing liquid, which makes it advantageous for mass-produced parts. Because urethane rubber has good low temperature properties, flex fatigue resistance, and resistance to oils, as well as very high tensile strength and tear, it can easily become a leading raw material in the rubber industry for its own sake, it was added.

Whereas solid urethane rubber is considered to be a new material with properties generally different than other rubbers and in many ways more useful as a replacement for certain metals, flexible urethane foam has been developed as a direct replacement for rubber latex foam. A comparison of the properties of these two foams was presented and Mr. Mahoney stated, that as with urethane rubber, it was felt that a great deal of urethane foam's ultimate potential rests on redesign, and as long as the furniture and automotive industries base their designs on existing materials and techniques, development progress will be slow.

The future of urethane materials will depend largely on redesign of basic units and components, and in the present day world the one thing that can be depended on is change, so that outlook for urethane materials is good, this speaker concluded.

"The Effect of Anti-Trust Laws and the Federal Trade Commission on Trade Association Activities," was the subject of a talk by Mr. DuBose. The trade association such as the RMA, performs a legitimate and useful function in our domestic economy in collecting and disseminating industry statistics and information; in keeping its members informed on pending legislation, tariff matters; in promoting the business and products of its members; and in many other ways. If during the course of a trade association meeting, how-

ever, some of the members discuss ways of stabilizing prices or allocating markets, they are guilty of a violation of the anti-trust law and are also acting foolishly since no price fixing agreement is effective if a really competitive stuation exists, this speaker said.

Mr. DuBose explained how anti-trust actions begin and advised his audience regarding their proper course of action if approached by government investigators, the gist of which was that they should obtain the services of a proper lawyer immediately and not turn over any documents to investigators until they were reviewed by the lawyer and duplicates made. Anti-trust laws are here to stay and with the $50,000 fine and other costs involved, they represent a consideration to be reckoned with, by not only trade associations, but their members.

E. Lee Martin, secretary of the RMA manufacturing committee next discussed the "Current Status of Labor-Management Relations," with reference to the rubber products industry. He pointed out that rubber has been keeping pace with the automotive industry in wage rates since 1945 and that early in 1958, the automotive industry had offered its workers an 8¢-an-hour wage increase.

He referred to the recent publicity given the management-labor relations in the rubber industry in the exchange of letters between the Big Four rubber companies and the United Rubber Workers union which had been published in the Akron newspaper.

Mr. Martin suggested that the present negotiations between management and labor in the rubber industry might drag until a settlement was reached in the automotive industry. The Goodyear Tire & Rubber Co. and the B. F. Goodrich Co., however, agreed to an 8¢-an-hour wage increase with the URWA on July 1.

C. W. Halligan, RMA treasurer, described the new Rubber Shippers Association, which has been formed as a separate association to enable certain rubber products manufacturers to combine shipments in order to take advantage of the lower freight rates on carload shipments.

A loading depot in Pawtucket, R. I., and Cambridge, Mass., will go into operation in July for shipments to the West Coast. Membership in the association is open also to companies marketing products in competition with those of rubber companies and the dues are $75 a year.

The final speaker on the program was Mr. Kavesh who made a report on the national economic outlook in which he concluded that our economy appears to be bottoming out of the worst recession since 1937-38. Production has been hard hit, unemployment is high, and profits are sharply lower. The causes of the recession are complex, but cuts in federal spending, inventory liquidation, slackening capital outlays, and

Eugene Z. DuBose, Alexander & Green

E. Lee Martin, RMA

Robert A. Kavesh, Chase Manhattan Bank

sagging exports explain most of the decline, he said.

For the next few months the economy may move fairly horizontally. Towards the end of the year a movement upward may begin, with the improvement extending into 1959, Mr. Kavesh said in conclusion.

SORG Outing

The Southern Ohio Rubber Group held its annual summer outing at Inland Activity Center and its golf tournament at Madden Park, both in Dayton, O., on June 7. Committee members of the affair, which was attended by some 130 members and guests, included: general chairman, J. M. Kelble, Wright-Patterson AFB; vice chairman, J. Feldman, Inland Mfg. Co.; golf chairman, A. LePera, Wright-Patterson; prize chairman, Wm. Herberg, Dow Corning Corp.; beverage chairman, R. Headrick, Wright-Patterson; food chairman, Mr. Feldman; and games chairman, P. House, Wright-Patterson.

The prize winners for golf, based on the first nine holes, were as follows: first low gross, W. McCutcheon, J. M. Huber Corp.; second low gross, W. Pender, General Magnesite & Mfg. Co.; high score, K. Murray, Wright-Patterson; best poker hand, J. Williams, Amsco Solvents; most birdies, H. Hamlin, Wright-Patterson; most fives, J. Jones, Inland Mfg.; and foot golf, E. Ipiotis, Inland Mfg. The winners of these events were given golf balls or golf shoes. Door prizes included steak knives, Scotch coolers, fishing rods, lawn chairs, barbecue outfits, etc. A prize was provided for everyone attending the picnic.

Polymerization Bath

Thiokol Chemical Corp.'s Hunter-Bristol division, Trenton, N. J., recently developed for its chemical division an improved bottle polymerization bath which enables simultaneous polymerization of up to 32 experimental monomer formulae. These improvements include the use of urethane to insulate effectively this device to maintain constant temperature during experimentation. The lightness of this Rigithane insulation eliminates the need of auxiliary devices to open a heavily insulated cover. Improved electrical engine design and mountings minimized the amount of vibration in the operation of this machine. Complete safety in polymer experimental work is assured through the heavy construction and insulating arrangement; while the amount of space required remains the same as before.

ASME Rubber & Plastics Detroit Meeting Papers on Foams, New Rubbers, Plastics

The Rubber & Plastics Division of the American Society of Mechanical Engineers held a one-day meeting on June 17 in Detroit, Mich., as part of the semi-annual meeting of the parent Society. The two half-day technical sessions of the Division dealt with foamed materials during the first session and new rubbers and plastics during the second session.

The chairman of the Division is R. W. Barber, Panelyte Division, St. Regis Paper Co. The secretary is R. D. Stiehler, National Bureau of Standards.

At the meeting of the executive committee of the Division it was decided that the Rubber & Plastics Division would participate in the annual meeting of the Society in New York, November 30 through December 5, 1958, with three technical sessions. One session will deal with adhesives, one with design considerations in engineering with plastics, and one with miscellaneous papers on the testing of plastics, machinery for plastics processing, and new elastomers.

F. W. Wehmer, General Adhesives Co., presented a summary of the papers given at the June meeting in Detroit, and from this summary and other sources the following résumé of the papers presented at this meeting has been prepared.

"Expandable Polystyrene—Applications and Fabrication," by D. F. Redman, Dow Chemical Co., described the use of expandable styrene beads to produce a rigid type of foam with densities from less than two pounds to more than 20 pounds per cubic foot. For the first time it is now possible to mold this form of polystyrene directly into a final shape rather than fabricate it from a block of foam.

Application of this foam in the fields of thermal insulation, structural materials, buoyancy, display (novelty and floral), packaging, electrical, etc., were discussed, as were fabrication techniques and properties. The material has water resistance, lightness, and moldability and should be of considerable interest to designers and engineers.

"Mechanical Properties of Low-Density Foams as Energy Absorbers," by Edward R. Dye and Milton D. Smith, Cornell Aeronautical Laboratory, Inc., included a short history of the research behind the development of energy absorbing materials. The authors described the test equipment and procedure used by the Laboratory to evaluate protective padding materials to avoid injuries to humans in private and public transportation and elsewhere. The method of presenting impact test information on low-density foams was shown, and a discussion of the results followed.

"Rigid and Semi-Rigid Urethane Foams," by James A. Margedant, Jr., E. I. du Pont de Nemours & Co., Inc., emphasized that a material to give maximum usefulness must be engineered to get the best results from it. Rigid urethane foams are finding widespread uses because they lend themselves so readily to variation of formulation and, hence, to variation in properties of the final foamed product. Outlined within this paper was a brief description of what a urethane foam is, its wide range of properties, how it can be physically handled or applied in commercial production, something about the market where it is already being used, and what is expected of it in the future.

"Rigid Plastic Foams," by M. H. Nickerson, consultant, formerly with DeBell & Richardson, reviewed the properties of a special type of epoxy rigid foam which has the characteristics of being dimensionally stable and of exceptional temperature resistance. It was pointed out that this material has been made by casting it in large pieces and then cutting it to the shape desired.

"Development of Sandwich Construction Refrigeration Cabinets," by F. R. Marshall, Westinghouse Electric Corp., electrical appliances division, gave details on a method which may find merit in the production of insulated structure by the use of sandwich panels. The low tooling cost for this method should make it possible to take advantage of new ideas and approaches in the refrigerator field since apparently the method lends itself well to cases where designers or engineers needed to make only one or two insulated boxes. Metal inner and outer skins are used in this improved sandwich construction.

"Designing with Rigid Polyvinyl Chloride," by M. Batiuk and J. A. Rolls, B. F. Goodrich Chemical Co., described the short- and long-term physical and chemical properties of two types of unplasticized PVC, one of which provides the maximum in chemical resistance, the other the maximum in impact strength. Variation in properties with temperature were also emphasized as an important design consideration.

The largest volume use of rigid PVC has been in piping, particularly where corrosion resistance is important. Fabrication techniques for such installations were therefore detailed. Another fast-growing field for rigid PVC is in tanks, tank linings, pump bodies and impellers, plating racks, ductwork, and filters. Another large area of future growth for this material is considered to be in architectural applications. It was pointed out that rigid PVC gives the designer a new structural material with which to work.

"New Developments in Silicone Rubber," by George M. Konkle, Dow Corning Corp., reviewed the properties of silicone rubber in comparison with other elastomers. Recent improvements have extended the range of application of silicone rubbers. These include a solvent-resistant fluorinated silicone rubber, silicone rubber with greatly improved strength, room-temperature vulcanizing silicone rubber, self-adhering silicone rubber tapes, and a silicone rubber with improved resistance to permanent deformation at elevated temperature. Fabrication techniques and applications were also discussed.

"Solid Urethanes—A New Method of Construction," by Kenneth A. Pigott, Mobay Chemical Co., described the properties of solid urethanes, which have been defined as elastomers, but have been successfully used as replacement for metals in many applications. High hardness, load bearing ability and elasticity of these materials have been used to advantage in the redesign of many parts formerly made of metal. Several interesting uses for the material were explained, and the savings possible, where solid urethane's unique properties were desirable and necessary, were illustrated.

"Structure Properties and Applications of Profax Isotactic Polypropylene," by E. W. Cronin, Hercules Powder Co., covered briefly the history and chemistry of isotactic polypropylene and its properties and applications. Besides the emphasis on some very interesting and unusual properties, certain areas of disadvantage were also pointed out. The author stressed the fact that it is going to take some time to determine where a material of this kind will best fit into the rubber and plastics picture.

Insulation Conference

American Institute of Electrical Engineers and the National Electrical Manufacturers Association are cosponsoring the First National Conference on the Application of Electrical Insulation, to be held at Cleveland, O., September 3-5. Advance reservations indicate that a large attendance may be expected at the conference, the first of its kind ever to be held in the United States. Program Chairman H. H. Chapman, Jr., Owens-Corning-Fiberglas Corp., New York, N. Y., recently announced that 130 technical papers have already been accepted for presentation.

Franklin Institute Medal to Patrick

Dr. Joseph C. Patrick of Yardley, Pa., the chemist who was discoverer and pioneer in the production of Thiokol oil-resistant synthetic rubber, in addition to having been selected to receive the 1958 Charles Goodyear Medal,[1] has been named recipient of an Elliott Cresson Medal which he will receive at formal ceremonies on October 15 in The Franklin Institute's Franklin Memorial Hall, Philadelphia, Pa. He is currently a consultant to Thiokol Chemical Corp., Trenton, N. J.

He is being honored for his discoveries in the field of polysulfide polymers, and for the new processes devised by him involving the combination of chemical compounds for the manufacture of a synthetic rubber having special properties adapted to critical uses and to the manufacture of a solid rocket fuel. Dr. Patrick has 50 patents to his credit.

The Cresson Medal was founded 110 years ago by Elliott Cresson of Philadelphia. It is awarded by the Institute, Philadelphia's oldest scientific-educational organization, to one or more persons for discovery or original research adding to the sum of human knowledge.

Dr. Patrick became interested in chemistry after the end of World War I when he worked as a chemist for the Armour Company in the Argentine to earn funds to finish medical school. He received his M.D. degree from Kansas City, Mo., College of Medicine and Surgery and immediately founded the Industrial Testing Laboratory of Kansas City. Following the discovery of the polysulfide elastomers, he established the Thiokol Chemical Corporation in 1929, serving as vice-president and director of research until his retirement in 1948.

He will receive the Charles Goodyear Medal in September at a meeting of the ACS in Chicago, Ill.

[1] See RUBBER WORLD, June, 1958, p. 429.

CALENDAR of COMING EVENTS

August 22
Philadelphia Rubber Group. Golf Outing. Manufacturers Golf & Country Club, Oreland, Pa.

September 3-5
First National Conference on the Application of Electrical Insulation. Cleveland, O.

September 6
Connecticut Rubber Group. Outing.

September 7-12
American Chemical Society. Chicago, Ill.

September 9-12
Division of Rubber Chemistry, ACS. Hotel Sherman, Chicago, Ill.

September 11
Northern California Rubber Group.

September 25
Fort Wayne Rubber & Plastics Group. Van Orman Hotel, Fort Wayne, Ind.

October 3
Detroit Rubber & Plastics Group, Inc. Detroit-Leland Hotel, Detroit, Mich.
Chicago Rubber Group.

October 7
The Los Angeles Rubber Group, Inc. Biltmore Hotel, Los Angeles, Calif.

October 9
Northern California Rubber Group.
Southern Ohio Rubber Group.

October 14
Buffalo Rubber Group. Hotel Westbrook, Buffalo, N. Y.

October 17
New York Rubber Group. Henry Hudson Hotel, New York, N. Y.
Boston Rubber Group. Hotel Somerset, Boston, Mass.

October 17-18
Southern Rubber Group. Roosevelt Hotel, New Orleans, La.

October 21
Elastomer & Plastics Group, Northeastern Section, ACS. Annual Meeting. Science Park, Charles River Dam, Boston, Mass.

October 24
Philadelphia Rubber Group. Poor Richard Club, Philadelphia, Pa.
Akron Rubber Group. Sheraton-Mayflower Hotel, Akron, O.

October 28
Assn. of Consulting Chemists & Chemical Engineers, Inc. Thirtieth Annual Meeting: Symposium, "What's New in Chemistry." Biltmore Hotel, New York, N. Y.

November 4
The Los Angeles Rubber Group, Inc. Biltmore Hotel, Los Angeles, Calif.

November 6
Rhode Island Rubber Club.

November 13
Northern California Rubber Group.

November 14
Connecticut Rubber Group. Manero's Restaurant, Orange, Conn.
Chicago Rubber Group.

November 17-21
Eighth National Plastics Exposition. Society of the Plastics Industry. International Amphitheatre, Chicago, Ill.
National Plastics Conference. Hotel Morrison, Chicago.

November 21
Philadelphia Rubber Group. Dance. Manufacturer's Golf & Country Club, Oreland, Pa.

November 30-December 5
American Society of Mechanical Engineers. Annual Meeting. New York, N. Y.

December 2
Buffalo Rubber Group. Christmas Party.

December 4
Fort Wayne Rubber & Plastics Group. Van Orman Hotel, Fort Wayne, Ind.

December 5
Detroit Rubber & Plastics Group, Inc. Christmas Party. Sheraton-Cadillac Hotel, Detroit, Mich.

December 12
New York Rubber Group. Christmas Party. Henry Hudson Hotel, New York, N. Y.
Boston Rubber Group. Christmas Party. Hotel Somerset, Boston, Mass.

December 13
Southern Ohio Rubber Group.

December 19
Chicago Rubber Group.

1959

January 23
Philadelphia Rubber Group. Poor Richard Club, Philadelphia, Pa.

January 30-31
Southern Rubber Group. Statler Hotel, Dallas, Tex.

February 3
The Los Angeles Rubber Group, Inc. Biltmore Hotel, Los Angeles, Calif.

February 4-6
American Society for Testing Materials, Committee D-11. Pittsburgh, Pa.

WASHINGTON REPORT

By JOHN F. KING

ICA Means Business for U.S. Firms; Reciprocal Trade Compromises Evident

The Administration in July was fighting desperately to save its foreign economic program from Congressional emasculation. Unprecedented efforts by the Executive Branch to rescue its embattled foreign aid and trade legislative package produced developments of more than passing interest to the rubber industry.

ICA Money to U. S. Firms

Of direct interest to the industry is a 100-page catalog prepared by the International Cooperation Administration setting forth the amount of foreign aid money paid out to American firms during the period January 1, 1954, to June 30, 1957. Quietly circulated to avoid charges by hostile Congressmen that the government agency is "lobbying" its own program, the ICA study nonetheless gets over the message that "Foreign Aid Is Good for You." The agency which prepared the report, of course, administers the aid program.

The catalog shows that during the 30-month period surveyed $2,010,917,315 was paid to thousands of American firms. The totals run as high as $112 million for a single company which provided goods sent abroad under the Mutual Security Program, to a few dollars to companies which sold goods or services to ICA and its procurement agencies.

Nearly $17 million went to an estimated three-score rubber companies, in amounts ranging from $2,936,620, paid to Goodyear Tire & Rubber Co. and its subsidiaries, to $173.63, received by American Hard Rubber Co. Of the total $16.8 million paid out to the rubber industry for "non-project" procurement—which means straight purchase deals with the companies involved—Firestone International Co. received $2,628,620; International B. F. Goodrich Co. got $1,967,593; and United States Rubber International received $1,286,814. Divisions of the larger companies, involving aid program purchases of chemicals, aircraft, etc., also received undetermined amounts of foreign aid money.

ICA officials hastened to explain that the catalog lists only the direct contract payments to U. S. firms and is not cross-filed to show how much indirectly got into the treasuries of companies supplying goods to other companies involved in direct contract procurement.

"It should be recognized," a covering explanation of the catalog points out, "that the supplier locations shown in these tables do not necessarily indicate the geographic impact of the Mutual Security Program in the United States."

As with private export trade in general, a large part of ICA-financed exports are made by merchant exporters, and these exporters tend to locate in port cities. For this reason large amounts of financing are shown for port cities such as New York (which accounted for over $800 million of the $2 billion total catalogued) or Philadelphia. These exporters are, of course, generally selling commodities produced in inland cities and towns.

In a compilation of this type it is not feasible to trace the products sold by merchant exporters to their points of origin, but in some instances the merchant exporters' names will reveal the ramification of ICA financing. Thus the products sold by General Motors Export Corp. under ICA financing are listed under New York City, although the products are manufactured by (or purchased by) GM plants throughout the country.

Because this is true, officials explain further, it is safe to say the business realized by the American rubber industry from the aid program exceeds by "many millions of dollars" the $16.7 million listed as direct contracting during the period.

"Nobody can even make a guess as to how much more," said one official close to the study, "but just look at the interrelationship of products and business organization in the rubber industry and you begin to get an idea of the share in the program the industry has had."

By way of example, B. F. Goodrich Chemical Co. purveyed nearly $2 million under the program; the same goes for U. S. Rubber's Naugatuck Chemical Division, and others.

ICA Fund Cuts Likely

Whether the study will help create that groundswell of popular support for the aid program which Administration managers are hoping for cannot be predicted. But that help is needed to persuade Congress to go easier on the program is clearly shown by the way the Legislative Branch has hacked away at President Eisenhower's $3.95 billion program for fiscal 1959.

The authorization bill, processed by the "friendly" Foreign Affairs committees of House and Senate, suffered only minimal damage—the total request was reduced just $274 million. More important, the authorization committees left intact the Administration's pet aid project, the Development Loan Fund, and recommended the full $625 million requested to be appropriated to help carry out long-term, low-interest lending in backward countries.

While the Senate and the House went along with their committees and voted the full authorization recommended, the House Appropriations Committee went to work with a meat-ax on the actual money bill. It hacked $872 million from the Administration's total request; most of the reduction was made in the "defense support" section of the program which provides economic assistance primarily to Asian and Middle Eastern nations allied with the United States in various mutual defense treaty systems. But the most painful slash in the Administration's view was the 50% reduction in the Development Loan Fund's appropriation. Officials complained bitterly the Committee's action left the Loan Fund, the key policy weapon available for fighting the cold war in the "Uncommitted" neutralist areas of Afro-Asia, a body without a head.

The drastic cut of 25% in the overall aid money bill stirred both the President and Secretary of State Dulles to make repeated public appeals for restoration of the funds, but the House upheld its Appropriations Committee. At mid-month the battle over the aid program shifted its locale to the Senate Appropriations Committee where Senatorial leaders hoped to restore some of the money. They were depending more on the war scare cranked up by U. S. military occupation of Lebanon, however, than on appeals from the Executive Branch and its public supporters.

Reciprocal Trade Compromise?

On the foreign trade front the Administration was faring a little better in its campaign to win a five-year extension of the Reciprocal Trade Act, the 24-year-old tariff-cutting program vigorously opposed by the Footwear Division of The Rubber Manufacturers Association, Inc. The Administration, thanks to deft maneuvering by the Democratic leadership, won a smashing victory in the House in mid-June when the bill was approved practically without change 317-98. The vote was remarkable in that up to the last moment the oddsmakers were touting it a 50-50 chance the House would tear the bill to pieces.

Once the conservative Senate Finance Committee got hold of the legislation, however, the Administration lost control of the situation. The Committee's Democrats led the drive to write restrictions into the bill, after cutting it from a five- to a three-year program, which would have removed the President from the tariff-making picture. The Administration rallied its forces before the legislation got to the Senate floor for a vote, and the prospects were good in late July that if not everything, President Eisenhower will get essentially what he requested back in January. The Senate was scheduled to vote out the three-year bill at RUBBER WORLD's press time, minus the so-called Kerr amendment which would have submerged the tariff powers of the Executive Branch under the complete control of Congress.

It is expected a Senate-House conference by August will have produced a compromise bill that extends the program the full five years requested, plus new powers to the President to cut tariffs by 20-25%. If the conference committee deadlocks on terms of a compromise, observers believe the program may be extended only four years. With 20-25% tariff-cutting authority, however, this is acceptable to the White House.

One of the great problems the President has been up against in selling his tariff program to Congress is the perfectly logical division in business circles over the wisdom of the program. This dichotomy of sentiment is admirably displayed within the rubber industry when foreign trade liberalization is the subject.

The Footwear Division of RMA, which testified against the bill in the Senate Finance Committee shortly before the Committee threw out the President's program and wrote its own, has vociferously opposed trade-agreement tariff cutting. Competitive imports, not only of rubber footwear, but more recently of rubber sundries, motivates this opposition, which is growing as various new foreign rubber goods hit the U. S. market.

Yet, as one official points out, "When you look at skyrocketing exports of synthetic rubber, you can't help wondering why industry opposition is so strong." He plaintively added: "But you still find it difficult to argue against these companies when they complain they're losing business because of our tariff policy. It just doesn't get through that if you curtail footwear or sundry imports, you might be risking the loss of millions of dollars worth of synthetic exports."

Washington Reviewing Overseas Investments

Rubber companies in July received a series of forms from the Commerce Department's Office of Business Economics asking such questions as the following:

Do you have voting securities or ownership certificates in foreign corporations, branches, partnerships, or proprietorships? Do you have a direct investment of 10% or more in any foreign-incorporated enterprise? Do you have in conjunction with American or foreign affiliates 25% or more invested in a foreign business?

If the response to any of these questions is "Yes," then the OBE will want detailed information on the following:

Payments for wages, taxes, and materials in connection with the overseas investment; sources of financing for the enterprise in question; breakdown of total output to show local sales and exports to the United States and other countries; imports; earnings and income remittances; and employment created in the foreign enterprise for both local and American personnel.

The agency's questions are not just idle inquiries. They are being made not only of rubber companies, but of all American businesses to determine whether, as it now estimates, private American capital directly invested abroad has doubled from the $12-billion-level reported in 1950, when the first postwar survey of private foreign investments was made, to the present total of $25 billion. The inquiries, moreover, are not idle because fully detailed answers are mandatory; the polled company is required by law to tell all about its foreign operations. In addition, the census forms must be returned to OBE by August 31.

OBE officials do not single out any industry, but when queried as to the applicability of the survey to the rubber industry, they merely comment that it is one of the leaders, if not among the biggest, in the foreign investment field. They hope, accordingly, to "mine much information" from rubber companies, according to one source.

The $50,000 study, OBE says, will provide a complete picture of the size and the composition of private U. S. investments abroad. The data developed will be the "basic statistics essential for the programming of the foreign operations of the U. S. Government, and will provide basic guides for the many firms that now have or are contemplating the establishment of productive facilities abroad."

IRSG Price Stabilization Issue All But Abandoned in View of U. S.-Malaya Deal

Though distracted by the Iraq-Lebanon crisis, Washington is still talking seriously about "commodity agreements" to stabilize prices of primary industrial materials as a means of solving vexatious international political problems. But one subject that has been quietly "put in abeyance" for the indefinite future is an agreement on rubber pricing and supply.

"The months ahead may see American-endorsed commodity plans for everything from non-ferrous metals to coffee blossoming out all over the place. But a rubber agreement couldn't be more remote," according to a high-ranking official with an important role in the multitude of discussions on the subject going on here the last couple of months.

U. S.-Malaya Agreement

A rubber agreement, with its trappings of market management, buffer stocks, etc., was shelved almost with an air of finality at the annual meeting of the International Rubber Study Group at Hamburg, Germany, in June. The burial ceremonies followed a tacit agreement between the United States and the Federation of Malaya, attending for the first time as an independent sovereignty.

The mechanics of the agreement are simple: The United States will not liquidate its 1.2-million-ton natural rubber stockpile. Malaya will abandon its long-standing position in favor of multilateral arrangements to peg the price of rubber, as did the Stevenson Plan of the 1920's and the International Rubber Regulations of the Thirties.

The Malayan delegation presented a paper to the Hamburg meeting on the question of the stabilization of rubber prices. But the conclusion of the study was that a rubber agreement is not really feasible. For Malaya to call a rubber agreement cumbersome in view of its strong support in the past for a commodity agreement was regarded as a significant reversal of position. It means that only Indonesia is still pressing hard for a price-fixing arrangement.

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policies with regard to rubber will remain unchanged. While this statement of position was no surprise, it did serve to reassure the rubber supplying nations, chief of which is Malaya, that the U. S. stockpile hoard will not be dumped on the market. This assurance is important to Malaya, which in abandoning the agreement idea has decided to compete vigorously against synthetic in the market as its high-yield acreages come in.

Officials back from the Hamburg meeting readily concede that "price regulation" was the prime subject of discussion. Following on the statement of Malaya's position, however, the delegates felt they could answer various appeals, particularly Indonesia's, for a stabilization agreement with a mild "No." The upshot was that the whole subject was handed over to the Management Committee with instructions "to keep the matter under review," and the session broke up after scheduling the next meeting two years hence.

This was not done before France presented its own stabilization scheme featuring a "flexible floor and a flexible ceiling." The plan features what one delegate called a "bureaucratic mess" to manage an international buffer stock that would sell when the market was falling and buy when the market was rising.

Consumption Estimates High?

Another sidelight to the Hamburg meeting was the optimistic forecast of natural and synthetic rubber consumption this year. It was estimated consuming countries would use up 3,152,000 long tons, 1,915,000 natural and 1,237,000 synthetic. American delegates, however, raise the question that the forecast may have been too optimistic.

The U. S. experts pointed out that while the official estimates took into account the fact that the recession has reduced industrial output in this country from 1957 levels, the forecast still might be a little too bullish.

To illustrate, they point out that this country in the official estimate is expected to consume a total of 1,335,000 long tons of natural and synthetic this year—482,000 tons of natural and 853,000 tons of synthetic. The total is down substantially from the 1957 total when consumption reached 1,465,000 tons.

But the U. S. experts noted that figures for the first four months of this year show actual American natural and synthetic consumption, when computed on the basis of an annual rate, running at a rate of only 1,270,000 tons, or 65,000 tons below the IRSG estimate. The U. S. experts also noted that while there are signs that the U. S. economy may be shaking off the slump and slowly showing signs of recovery, nobody can predict what the amount of pickup will be by the end of the year.

Wage Increase Granted URW; Price Boosts To Follow; Pension Bargaining in 1959

There will be labor peace in the rubber industry—at least until April 15 of next year when negotiations on pension and welfare benefits begin—as a result of an 8¢-an-hour wage boost agreed to by The Goodyear Tire & Rubber Co. and The B. F. Goodrich Co. The July 1 agreement with the United Rubber Workers union (AFL-CIO) is expected to be followed by similar wage agreements by the other two companies of the Big Four, Firestone Tire & Rubber Co. and United States Rubber Co., which were still negotiating at RUBBER WORLD's press time.

Price Increases To Follow

If apparently well-founded reports circulating at press time may be credited, it would seem the average 3% wage boost is to be followed shortly by tire price increases of roughly the same magnitude.

Word from Akron was that the major manufacturers were all but decided on price hikes of between 2½-3% on first- and second-line tires 2½-5% on truck tires and as much as 7½% on premium passenger tires.

1959 for Pension Bargaining

The wage settlement made on the same night in separate negotiations with the URW in Cleveland by Goodyear and Goodrich covers about 33,000 employes in Akron and other cities. The meeting of minds came just half an hour before the companies' contracts with URW expired. According to the Union the eleventh-hour settlement "ended the threat of a Tuesday July 1 midnight strike."

Partly in exchange for the across-the-board wage increases which became effective June 30, URW agreed to put off further negotiations on pensions and insurance improvements until its companywide agreements with Goodyear and Goodrich come up for renegotiation early next year. The pension-welfare pacts expire April 15 1959. Under the terms of this five-year contract signed in 1955 the Union was permitted to open it for renegotiation once after February of the current year.

URW Comments

The talks with Goodyear on a wage settlement had gone on since June 10 at Cleveland's Carter Hotel under a URW notice of termination of its contract by midnight July 1. Talks under the same conditions with Goodrich had been going on at another Cleveland hotel since June 5. URW negotiations with Firestone in Canton, O., under a July 8 deadline continued since June 16; while the Union's negotiations with U. S. Rubber under a July 13 deadline had been held in New York since June 17.

The increases from both companies are for incentive employes and will be incorporated into their incentive rates to reflect the 8¢ boost at current earnings levels.

According to L. S. Buckmaster, URW International president, "We believe this settlement compensates for the cost of living increases that have taken place during the last year."

The Union chief has argued since the wage contract issue came up in the spring that the companies have a responsibility to pay more to put into the hands of consumers more spending power. Management spokesmen have urged a go-slow approach to new wage boosts arguing that price increases in a recessionary period could only bring further deflation by encouraging consumers not to buy.

While URW's national leadership was negotiating with the Big Four producers, Local 87 of the Union in Dayton, O., won from General Motors Corp. a two-year extension of its present contract with GM's Inland Rubber subsidiary calling for wage boosts of at least 6¢ an hour, or 2½% of present rates, whichever is higher; another wage increase of the same amount next May 29: continuation of the cost-of-living increases and welfare and pension benefits. The Dayton Local's new contract covers 3,000 URW members.

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RMA Sundries Division Studies Import Growth

The Sundries Division of The Rubber Manufacturers Association, Inc., held its annual meeting at Skytop Lodge, Skytop, Pa., on June 16 and 17. A special committee was appointed to study the impact of imports on the domestic production and sales of various products manufactured by members of this group.

Manufacturers of several such items, particularly catheters, surgical tubing, surgeon's gloves, household gloves and bathcaps, have been concerned for some time over the steady increase in the importation of such products. The special committee named to review the situation and recommend a course of action includes: Robert B. Little, Davol Rubber Co.; John W. Simmons, Wilson Rubber Co.; and Western Wiles, Faultless Rubber Co.

The following were elected to serve on the executive committee of the RMA Sundries Division for the ensuing year: John D. Horne, Eberhard Faber Pencil Co.; Mr. Little; C. R. Porthouse, Pyramid Rubber Co.; Mr. Simmons; and C. P. McFadden, RMA, chairman.

INDUSTRY NEWS

Cyanamid Relocates Rubber Group

Closer liaison among research, production, and sales has resulted from the recent relocation of American Cyanamid Co.'s rubber chemicals research group at Bound Brook, N. J., according to J. G. Affleck, manager of the company's rubber chemicals department. This action will also provide increased service benefits to the rubber industry.

Formerly in Stamford, Conn., the rubber chemicals research section is now part of the new Bound Brook research center, dedicated last year.[1] Rubber chemicals research occupies an area of more than 5,000 square feet on the first two floors of the new building. Manager of this section of the new laboratory is A. R. Davis, who has directed Cyanamid's rubber chemicals applications studies for 21 years.

Synthesis of new chemicals for the rubber industry is the responsibility of F. A. V. Sullivan and his group of chemists. New compounds are either prepared by his group or procured from some other research group within the company. Among the outstanding products this research has developed are Antioxidant 2246 [2,2'-methylenebis (4-methyl-6-tertiarybutyl phenol)], Pepton 22 plasticizer (di-orthobenzamidophenyl disulfide), DIBS accelerator (N,N-diisopropyl benzothiazole-2-sulfenamide), and NOBS accelerator (N-oxydiethylene benzothiazole-2-sulfenamide).

J. H. Thelin is the group leader for rubber chemicals evaluation and applications studies. The dry rubber compounding and latex rooms used by this group are equipped to perform all the applications research and compounding operations required to service the rubber industry.

Adjacent to the dry rubber compounding room are three enclosed areas: one for sample weighing and raw materials storage; the second for aging and storing rubber samples at a constant temperature and humidity; and the third for mixing black rubber stocks. Equipment here includes six- by 13-inch mills, a 300-gram Banbury mixer, and a two-by-six-inch mill for compounding small batches of rubber.

Also adjacent to the dry rubber compounding room are four presses and an autoclave for open-steam curing of rubber stocks. Six oxygen bombs for aging rubber stocks, a Mooney viscometer, and other apparatus necessary for testing uncured and process stocks complete the equipment available.

The latex or wet rubber laboratory bay is kept at a constant temperature and humidity and contains ball mills, ovens, emulsifiers, and other processing control equipment. Here the evaluation group studies the problems of handling, stabilizing, and processing latex stocks. Potential antiozonants are screened in another laboratory area.

Physical testing of cured rubber samples is carried out by technicians in research service. Properties that can be evaluated include tear, brittle point, stress and strain, and abrasion resistance. Tear is measured by one or more approved methods, one of which is the angle tear test which was developed in the company's Stamford laboratories. The test has since become a standard method of the American Society for Testing Materials.

Conducted in an adjacent laboratory bay are such other tests as creep, cell oven aging, sun lamp and ozone exposure of rubber as well as flexometer tests for heat build-up measurements.

In the air-conditioned laboratories a split-stream air-conditioning system has been installed for fume disposal. A stream of cooled air and a stream of uncooled air comprise the final mixture which passes through the hoods.

The main efforts of the rubber chemicals research section will be to discover and develop other functional chemicals that will be required to meet the needs of both natural and synthetic rubbers produced by the progressive rubber industry. Attention will also be given to extending the range and application of Cyanamid's present line of rubber accelerators, peptizers, retarders, and antioxidants.

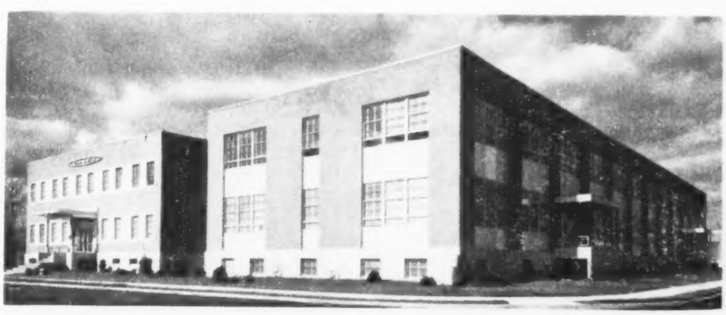
[1] RUBBER WORLD, Nov., 1957, p. 274.

Firestone Announces New Polybutadiene

Raymond C. Firestone, president, Firestone Tire & Rubber Co., Akron, O., has announced the development of a new polybutadiene rubber called Diene and made with lithium metal derivatives as catalysts. The new rubber is the latest development in a research program which led a few years ago to the development of Firestone's synthetic polyisoprene, or Coral rubber, and foreign patents, issued during the past year, also include coverage on Diene rubber.

An interim report of this new polybutadiene rubber states that although various catalyst systems can be used to prepare rubbers from butadiene, the system favored by Firestone uses lithium metal derivatives, and the Diene rubber thus produced is substantially different in polymer structure than that obtained with Ziegler or modified Ziegler-type catalysts. It appears, however, that rubbers prepared from butadiene by various catalyst systems give about the same performance when blended with natural rubber and used in tires and other rubber products.

Diene rubber was developed as an extender for natural rubber and, as such, may play an important role along with Coral rubber in conserving the use of natural rubber and in minimizing the necessity of stockpiling natural rubber for wartime emergencies, it was said. Tire tests indicate that Diene rubber can be used to replace a substantial portion of the natural rubber in truck tires and results in improved crack resistance, satisfactory running temperatures, and greatly improved skid resistance due to the good low-temperature flexibility of this polybutadiene rubber at low temperatures. Hysteresis of Diene rubber appears to be intermediate between those of natural and styrene-butadiene rubbers.



New laboratory now houses Cyanamid's rubber chemicals staff

Akron U Celebration; Hall of Fame Program

The University of Akron will celebrate the fiftieth anniversary of the teaching of rubber chemistry at the University and establish the Rubber Science Hall of Fame on the Akron, O., campus on Friday, October 3. Announcement of these events was made by Harry P. Schrank, chairman of the committee in charge of program, executive vice president of the Seiberling Rubber Co., and vice chairman of the board of directors of the University of Akron.

Harry P. Schrank

Norman P. Auburn, president of the University, will keynote the all-day program at a morning convocation of faculty, students, and honored guests in Memorial Hall. Following an informal luncheon, Maurice Morton, director of the University's Institute of Rubber Research and professor of polymer chemistry, will preside at an afternoon symposium on "Macromolecules and Elastic Networks" in Memorial Hall.

Participating in the symposium will be G. Stafford Whitby, consultant on rubber research and professor emeritus of rubber chemistry at Akron U; Peter Debye, Nobel Award winner in 1936 and professor emeritus of chemistry at Cornell University; and P. J. Flory, executive director of research, Mellon Institute.

Dr. Whitby's subject will be "A 50-Year Retrospect of Rubber Science"; Dr. Debye will describe "Measurements of Macromolecules"; and Dr. Flory will discuss "Rubber Elasticity."

Establishment of the Rubber Science Hall of Fame will follow the symposium. The naming of the first members, to be chosen by a committee of scientists from the Division of Rubber Chemistry, American Chemical Society, and the faculty of the University of Akron, prior to the October 3 program, will be a high point of the afternoon program. Portraits of Hall of Fame members will hang in the chemistry library, newly located in Knight Chemical Laboratory, the home of chemistry activities at the University.

Plans for an evening banquet, featuring an eminent scientist as speaker, are developing, but announcement is withheld at this time pending final arrangements, according to Mr. Schrank.

Members of the committee for the observance of the fiftieth anniversary of teaching of rubber chemistry, appointed by Dr. Auburn include: Chairman Schrank; Dr. Auburn; L. M. Baker, General Tire & Rubber Co.; George W. Ball, Akron U; E. H. Cherrington, Jr., dean, Buchtel College of Liberal Arts, Akron U; O. D. Cole, Firestone Tire & Rubber Co.; J. D. D'Ianni, Goodyear Tire & Rubber Co.; Dr. Morton; Waldo Semon, B. F. Goodrich Co.; and Thomas Sumner, head of the department of chemistry, Akron U.

Thomas Head of ASRC

The retirement of Bancroft W. Henderson as president, American Synthetic Rubber Corp., Louisville, Ky., and the election of Grant Thomas as president and a director of the company have been announced. Henderson will continue as a member of the board of directors.

Mr. Henderson's retirement comes after more than 50 years in the rubber business. Before election as president of ASRC in 1955, he had been associated with American Cyanamid Co.

Thomas was formerly president of United Carbon Co., Inc., principal operating and sales subsidiary of United Carbon Co., with which he had been associated since the year 1945.

Grant Thomas

B. W. Henderson

American Synthetic Rubber Corp. was organized in 1955 to purchase a government-owned synthetic rubber plant in Louisville. Stock in ASRC is now held by 28 companies representing the chemical, shoe, rubber, and wire and cable industries. In addition to various types of synthetic rubber, the company also manufactures polymers used in the production of rocket and missile propellants.

Sun Considers Merger

Creditors of The Sun Rubber Co., Barberton, O., have been asked to consider plans for the reorganization of the company. The company's creditors were notified of the request by a creditor's committee after a petition for the arrangement was filed by Sun in the United States District Court in Cleveland, O.

Meanwhile, the company is filling orders for toys, dolls and athletic balls and is maintaining its sales contacts with buyers whom it has served since 1923.

At the present time Sun Rubber is negotiating with several companies which have indicated an interest in a merger with the Barberton firm. The merger would enable the company to improve its working capital situation and allow the firm to further develop its new lines of housewares, automobile mats and molded rubber automotive products.

Last year Sun spent substantial sums to convert from rubber to vinyl toys and dolls, to develop and build new machinery and to do research and development on housewares and automobile mats. The latter drew widespread interest from housewares and automotive buyers when samples were shown early this year.

U.S.S.R. Plastics Industry Report By U. S. Team

The United States Plastics Industry Team arrived in Moscow on June 2. On June 3 the team met with officials of the Chemical Ministry to discuss and agree upon an itinerary of plant visits. On June 4 visits were commenced. In order, the team made plant visits in Karacharov, Kuskov, Orekhovo Zueyevo, Vladimir, Leningrad, then in the Southern cities of Yerevan, Tbilissi and Grozny.

Visits were also made to the Institute of High Molecular Compounds and to the Polymerization Research Institute in Leningrad, the Kharkov Research Institute and the Institute for Elemental Organic Compounds in Moscow. Within the U.S.S.R. the team traveled nearly 6,500 miles.

Chemical Plants

The chemical plants visited there were characterized by the principle of continuous operation which is basic to any well-engineered chemical process. The team was impressed with the attention given to instrumentation and to the quality and intelligence of the personnel working on the control boards. The housekeeping and general maintenance around the chemical plants were above average, and in the newer plants was noted the application of stainless steel in processes where corrosion is likely. The team expressed the belief that where the level of the Soviet chemical operations is comparable with those of the U. S. in size and age, the technical results are about equal. Russia's ability to expand her chemical operations further will undoubtedly be limited by equipment rather than by the lack of raw materials or manpower, it was said.

Plastics Industry

Compression and injection operations, laminating, raw material manufacture and chemical processing were included in the schedule. The compression molding factories visited were equipped with batteries of hydraulic presses ranging in size from 100 to 2,000 tons rated pressure. The smallest plant visited contained about 150 presses. The tool making facilities in at least one of the plants visited were excellent, judging from the complexity and quality of molded product. None of the injection molding operations observed compared with the compression molding. This may be accounted for since the emphasis in the U.S.S.R. has been on industrial rather than on consumer goods production.

As the plastics industry of the U.S.S.R has been developed, it has been designed and equipped to supply the essential plastics components required in manufacturing basics such as components for trucks, electrical equipment and in providing essentials like acrylics sheets for aircraft glazing. These considerations account for the well-designed complete compression molding plants the U. S. team visited. On a comparative basis more progress has been made in providing facilities for the manufacture of thermosetting materials than for thermoplastics. Consequently, the compression molding the team saw was more impressive than the injection molding.

The table below reports on the production of plastics materials in the U.S.S.R. for 1957. These statistics were supplied by the Soviet Chemical Ministry.

	Pounds
Phenolic and other tar acid resins	143,300,300
Epoxy and alkyd resins	64,374,904
Silicones	4,850,164
Urea and melamine resins	118,608,556
Caprolactam-nylon	28,219,136
Fluorocarbon and other related materials	44,092,400
Thermoplastics—all types	133,399,510
Total	536,824,970

Expansion Plans

The Soviet Government has been dissatisfied with the progress which has been made in the production of synthetic fibers and plastics, as revealed in Premier Kruschev's report to the Central Committee of the Communist Party of the Soviet Union on May 6, when he indicated that there still exists a considerable lag in the field of artificial and synthetic fibers and plastics. It was proposed to extend the capacity of enterprises producing artificial and synthetic fibers by 4.6 times; those producing plastics and synthetic resins by 8 times; and those producing synthetic rubber by 3.4 times.

For that purpose it is being planned to build or reconstruct in 1958 to 1965 a total of 257 enterprises of chemical and related industries; that will include the completion of the building of 37 enterprises which are already under construction, the building and putting into operation of 120 new ones, and the expansion of 100 enterprises which are already functioning. For this planned expansion, it is being considered to allocate means for capital building in the sum of over 100 billion rubles.

Encouraged by the Government's policy to provide more consumer goods for the people of the Soviet Union, the Chemical Committee is giving aggressive consideration to expanding the production of thermoplastics, particularly polyethylene.

Education and Research

In the 33 universities of the U.S.S.R. over 166,000 students are enrolled and in the other 765 institutions of higher learning over 1,800,000 students. The Academy of Sciences governs or influences the work of over 250,000 Soviet scientists. It has under its direct supervision, in the chemical division alone, 10 research institutes. The Chemical Committee operates 26 research institutes. Members of the United States plastics industry team visited five of them including the Leningrad Polymerization Institute where some 1,100 workers are said to be employed in research on polymerization chemistry, including pilot plant work. The extent and quality of the research made a favorable impression on the team.

Considering the educational program and the amount of research which is going forward, along with the results that have been achieved, it was felt that the United States should keep posted on the research activity as it relates to plastics, according to The Society of The Plastics Industry, Inc., New York, N. Y. A complete report on the team's visit to the U.S.S.R. is being prepared by SPI. Members of the team consisted of U. S. plastics manufacturers and for identity, see RUBBER WORLD, June, 1958, p. 447.

New DeVilbiss Unit

Additional facilities to provide complete finishing systems to industry are now offered by The DeVilbiss Co. through a new wholly owned subsidiary, DeVilbiss Metal Fabricators Co., Detroit, Mich. It was recently announced that the new firm is the result of the consolidation of the Peters-Dalton division of Detroit Harvester Co. and Newcomb-DeVilbiss Co.

Both are engaged in the manufacture of industrial ovens, heavy-duty waterwash spray booths, parts washers, dust collectors, and a wide variety of kindred equipment, metal-cleaning and rustproofing machines, pickling units, dip systems, continuous or intermittent conveying systems, flow coaters, and replacement air systems.

As a result of the consolidation, DeVilbiss, it is said, becomes the only company in the finishing field able to offer manufacturing, engineering, sales, and service for a complete finishing department or any part thereof.

Reber C. Stupp, formerly general manager of Peters-Dalton, has been named vice president and general manager of the new company. J. W. Cornelius, head of engineering for Newcomb-DeVilbiss, is now vice president-engineering; while T. Kenneth McGuire, sales head for Peters-Dalton, has been made vice president-sales of DeVilbiss Metal.

Headquarters of DeVilbiss Metal Fabricators will be maintained at 17900 Ryan Road, Detroit, Mich., and manufacturing facilities will be utilized at both the Ryan Road address and in the former Newcomb-DeVilbiss plant at 5741 Russell St., Detroit. Headquarters of the parent company are in Toledo, O.

New, Improved Synpol Black Masterbatches

Texas-U. S. Chemical Co., New York, N. Y., has introduced new types of general purpose, synthetic rubber-carbon black and oil-black masterbatches. This styrene-butadiene rubber, reinforced with an ultra dispersed carbon black, has been designed for use in the tire manufacturing and retread industry. The new masterbatches are said to have been commercially proved in severe tire road tests and are now available in commercial quantities.

In an extensive development program started last year, Texas-U. S. Chemical undertook to develop methods of non-chemical dispersing carbon black on a plant scale at its Port Neches, Tex., manufacturing facilities. This commercial process was based on Columbian Carbon Co.'s method[1] which demonstraated that a carbon black dispersion and a stronger carbon-rubber bond could be effected through the use of specially designed mixing equipment. Due to limitations of pilot-unit results, full-scale production equipment was developed and installed at Port Neches to produce this new type of masterbatch under controlled commercial conditions.

The long sought for advantages which are realized by the reduction of carbon black agglomerates and the elimination of non-rubber addition agents are most dramatically demonstrated in tires and in the fast-growing retread industry. Other outstanding qualities of black masterbatch are of considerable interest in many other rubber applications such as wire coating and molded mechanical goods.

The elimination of dispersing agents and coagulating salts results in low ash contents for these SBR masterbatches. The lower power required, shorter mix cycles and cleanliness of these masterbatches in the consumer's plant together with the uniformity assured from a fully proved production process recommends their use in a wide variety of rubber industry compounding.

The various Synpol black masterbatch types now available in carload quantities appear in the table below.

[1] RUBBER WORLD, Sept., 1957, p. 835.

	Rubber	Black	Oil
Synpol 8150	100 pts. 1500 Type	50 pts. HAF	None
Synpol 8250	100 pts. 1703 Type	50 pts. HAF	25 pts. highly aromatic
Synpol 8251	100 pts. 1711 Type	75 pts. HAF	37.5 pts. highly aromatic

Only 58.2% NR Imports Conform to Standards

The quality analysis of crude natural rubber imports into the United States in 1957, made jointly by The Rubber Manufacturers Association, Inc., and the Rubber Trade Association of New York and completed in June, showed that only 58.2% of the arrivals conformed to purchase standards.

The current import analysis was made separately for the new International grades[1] and all other grades. No separation was made as between the six overlapping RMA and six Singapore grades. The chairman of the RMA crude rubber committee, W. J. Sears, noted in connection with this report that:

"The separation made in this 1957 report between International grades and 'All Other' demonstrates a better record of conformance for the International grades compared to the others."

In comparison with 1956 results, the chairman pointed out that the accompanying table indicates some measure of improvement during 1957 in that a greater proportion of the imports was within only 1/4 grade off purchase standard and that the proportion of imports that was a half or more grades off declined. He called attention to the fact that in view of the smaller sample of total imports analyzed during 1957, as compared to 1956, this indication of apparent improvement should be treated with reservations.

SUMMARY OF NATURAL RUBBER IMPORT QUALITY

	1957			1956		
	All Grades	Int. Grades	Other Grades	All Grades	Int. Grades	Other Grades
Complete conformance	58.2%	69.4%	39.8%	58.2%	68.4%	40.0%
Change 1957/1956	(0)	(+1.0)	(−0.2)			
Within 1/4 grade off	82.8%	89.8%	71.4%	80.1%	86.0%	69.6%
Change 1957/1956	(+2.7)	(+3.8)	(+1.8)			
1/2 or more grades off	17.2%	10.2%	28.6%	19.9%	14.0%	30.4%
Change 1957/1956	(−2.7)	(−3.8)	(−1.8)			

[1] "Type Descriptions and Packing Specifications for Natural Rubber Grades Used in International Trade," Rubber Manufacturers Association, Inc., New York, N. Y.

J. H. Gibson

Pioneer's 40 Years

The Pioneer Rubber Co., Willard, O., manufacturer of Stanzoil, Stanflex, Sheergrip, and Nimble Fingers industrial gloves, recently celebrated its fortieth anniversary. In an official announcement to his business friends, Pioneer President J. H. Gibson stated:

"From the beginning, we've left the ulcers to the big city boys. We've tried sincerely to create the best possible value in the products we sell, and we've had a lot of fun doing it. And evidently this philosophy has worked, because we've grown into the world's largest manufacturer of dipped products."

From its first location in an abandoned windmill factory on the outskirts of Willard, Pioneer's present operations have grown to include plants in California and Texas as well as the main buildings in Willard and nearby Attica, O. Besides its domestic market, Pioneer's export trade extends worldwide.

Through the hand-protection clinic, a specialized free service relating to industrial employe hand protection, Pioneer researchers analyze all of the facets of a particular manufacturer's problem and recommend the proper hand protection for the particular job involved. This clinic has helped industrial operators to achieve greater worker efficiency and establish better safety records. This service, coupled with the recently developed industrial glove wall chart and glove selector check list—which provide specifications and detailed performance ratings of Pioneer industrial glove models—is all part of the company's continuing program to provide complete hand-protection services to industrial glove users.

In addition to industrial gloves, the company manufactures rubber and neoprene gloves for surgeons and housewives, as well as a full line of Qualatex balloon toys.

Committee D-11 Assigns Three SBR Numbers

Committee D-11 on Rubber and Rubber-Like Materials of the American Society for Testing Materials through Subcommittee 13 on Synthetic Elastomers of D-11 has assigned numbers to three styrene-butadiene elastomers (SBR), SBR 1507, SBR 1713, and SBR 1714, requested by Goodyear.

Description of Types of Styrene-Butadiene (SBR) Elastomers—Assignment of New Code Numbers—ASTM D 1419-56T

Number as assigned	1507	1713	1714
Date assigned	6/6/58	6/6/58	6/6/58
Requested by	Goodyear Tire & Rubber Co.	Goodyear Tire & Rubber Co.	Goodyear Tire & Rubber Co.
Distinctive feature	40 Mooney viscosity polymer	50 parts non-stain oil masterbatch	50 parts oil staining masterbatch
Close previous number, if any	1502, RPF68A	X709 GRS, RPF64A	X721 GRS, RPF63A
Type	1507	1713	1714
Nominal temp., °F.	43	43	43
Activator	FRA	FRA	FRA
Shortstop	ND	ND	ND
Catalyst	OHP	OHP	OHP
Emulsifier	mixed	mixed	mixed
Nominal conversion, %	60	60	60
Nominal Mooney viscosity, ML-1-4 (212° F.)—polymer	40	52	52
Compound	55	—	—
Nominal bound styrene, %	23.5	23.5	23.5
Coagulation	SA	SA	SA
Oil type	—	NAPH	HI-AR
Parts	—	50	50
Finishing	normal	normal	normal

Note: Abbreviations and symbols are defined as follows:
FRA = free radical type, i.e., iron-pyrophosphate, peroxamine sulfoxylate
ND = non-discoloring
OHP = organic hydroperoxide
SA = salt-acid
NAPH = naphthenic
HI-AR = highly aromatic

Tire Rupture Tests; Nylon vs. Rayon Cord

American Viscose Corporation, a leading supplier of rayon reinforcing cord for tire construction, has reported the results of a unique series of tire rupture resistance tests which show that tires reinforced with super rayon cord withstood higher internal pressures than those reinforced with nylon cord. The tests were conducted by Motor Vehicle Research, Inc. of South Lee, N. H., and included popular brands of both rayon and nylon tires. The results showed that most of today's passenger car tires can safely withstand pressures up to ten times the recommended inflation.

The MVR tests were designed to determine the amount of internal pressure a typical passenger car tire body can withstand without rupture. The internal strength of a tire body is largely a function of its reinforcing cord, and subjecting cord to a build-up of pressure and force is a new concept in tire structure study. These were the first such tests to subject tire reinforcing cord to this type of examination, it was said. Essentially the tests consisted of properly mounting and seating the tires on standard automobile wheels and slowly building up the internal pressure of the tires with compressed air until the tire body ruptured.

MVR chose for these tests, rayon and nylon tires from four leading tire manufacturers as well as a leading chain store brand. For each manufacturer the rayon and nylon tires were selected as nearly equivalent in construction as possible. The rayon tires were all rated as "first line" or "100 level", the same type specified as original factory equipment on new cars. In some of the brands tested, however, all nylon tires were rated as "premium" or higher than "100 level", it was said.

Maximum pressures for each of the tires included in the MVR rupture resistance tests are ranked as shown in Table 1.

Table 1

Tire Brand	Reinforcing Cord	Tire Code	Rupture Pressure, Psi.
Manufacturer A	Rayon	H	302
D	Rayon	T	300
D	Rayon	U	290
C	Rayon	Q	284
C	Rayon	R	276
Chain Store Brand	Rayon	B	276
	Rayon	A	272
Manufacturer A	Rayon	G	270
A	Rayon	E	268
A	Rayon	F	266
B	Rayon	L	220
B	Rayon	K	218
Manufacturer C	Nylon	O	278
A	Nylon	I	276
C	Nylon	P	272
A	Nylon	J	270
B	Nylon	M	262
D	Nylon	V	258
Chain Store Brand	Nylon	D	248
	Nylon	C	241
Manufacturer D	Nylon	W	240
B	Nylon	S	190

U. S. Rubber Closes Fort Wayne Plant

United States Rubber Co., New York, N. Y., has announced that it will close its industrial rubber products plant in Fort Wayne, Ind., because it cannot operate the plant at a profit. Approximately 700 employes will be affected by the closing, which will be accomplished gradually over a period of about four months. Production machinery for the plant's major products will be transferred to other plant locations.

Since the plant's purchase in 1946, it has operated unprofitably except during the Korean War period when it had the benefit of government contracts. Two major factors were behind the plant's inability to operate profitably. First, it has suffered severe competition from many smaller manufacturers producing similar products. Second, it has consistently paid higher wages than its competitors.

The current recession has been particularly severe in industrial rubber products, and the company now has idle floor space available in several other plant locations which can be used to better advantage for many of the products now being made at Fort Wayne.

The Fort Wayne plant currently manufactures various rubber-to-metal parts for the automotive industry, steering wheels, plastic pipe, dock fenders, tank linings, industrial grinding wheels, and a variety of molded and extruded articles made of both rubber and plastic.

The company plans to transfer production machinery and equipment from Fort Wayne to its plants in Chicago, Ill., Mishawaka, Ind., and Passaic, N. J.

Industry News

SPE Honors Graduates

The first plastics engineering degrees ever to be conferred were granted to eight graduates of Lowell Institute of Technology, Lowell, Mass., on June 15. Twenty-three members of the Class of 1959 are expected to receive the same Bachelor of Science in Plastics Engineering degree one year hence.

To recognize this event and to honor the recipients, three national officers of the Society of Plastics Engineers, Inc., participated in a special meeting of the graduates and faculty members on the preceding day. The SPE national president, R. K. Gossett; the national director representing the SPE Eastern New England section, Ralph L. Mondano; and the SPE executive secretary, Thomas A. Bissell, addressed the group on the plastics industry—present and future; opportunities in plastics engineering; and the SPE.

Others attending the meeting were Prof. Russell W. Ehlers and Instructor Raymond O. Normandin, of the faculty, and the following 1958 graduates with B.S. in P.E. degrees: Brooke H. Anderson, Edward A. Buonopane, Alden R. Bratt, Gerald M. Meehan, Raymond W. Michaud, Victor W. Proulx, Charles W. Rowntree, and Raymond D. Sylvain. Three of the graduates will enter industry; two will enter military service; and the others have not as yet made definite selections.

Completes Cuban Plant

United States Rubber Co., New York, N. Y., has announced that its Cuban tire plant built and cured its first tire just 10 months and 13 days after ground was broken for the plant. Erected at a cost of approximately $5 million, the plant has an annual production capacity of 125,000 passenger and truck tires. It is said to be Cuba's largest tire plant.

The plant was constructed to keep pace with the rapidly rising demand for tires in Cuba. Over the past 10 years the number of autos, trucks and buses in Cuba has more than tripled, a rate of increase surpassing that of the United States.

The new plant is on a 15-acre site in Loma de Tierra, just 15 miles east of Havana. The site is also partially occupied by a U. S. Rubber footwear plant, and total employment at the two plants is about 800 persons.

The plant was constructed by the Frederick Snare Corp. of New York and Havana, and has a one-story main building with 54,000 square feet of floor space and a two-story building with 25,000 square feet of floor area. It has the latest tire-making equipment available, and is the fifth tire manufacturing plant of the rubber company in Latin America. Other tire plants are located in Mexico, Colombia, Venezuela and Argentina. U. S. Royal tires are produced for the company in Brazil and Uruguay.

Kaiden Kazanjian

A. R. Kemp

Kemp USC, Tlargi Research Associate

A. R. Kemp, consulting chemist specializing in all phases of research on rubber and formerly in charge of research and development on rubber, plastics, wire and cable insulations, adhesives, coatings, and organic chemistry at Bell Telephone Laboratories, Inc., has been appointed a research associate at the University of Southern California. He will be engaged in fundamental research in the field of high polymers and rubber under the auspices of The Los Angeles Rubber Group, Inc., (Tlargi) Rubber Technology Foundation. Tlargi has a fully equipped rubber laboratory at USC.

Mr. Kemp has had a long and varied career since graduating with a B.S. in chemistry from California Institute of Technology in 1917. He did graduate work at Cal Tech from which he received his M.S. in 1918. He has continued his work towards a Ph.D. and has three theses published.

During his 30 years with Western Electric and Bell Telephone Laboratories, Mr. Kemp has been responsible for many important projects and has 49 publications in various technical journals and 38 United States and about 300 foreign patents in the rubber, plastics, and electrical insulation fields. He is the inventor of "Paragutta," widely used for insulation of deep-sea telephone cables; developed neoprene jackets to replace cotton braids on telephone wires; introduced polyethylene for high-frequency insulations and as jackets to replace lead on lead-sheathed telephone cables; and has patents on the high-speed continuous vulcanization of rubber covered wire.

He retired from Bell Labs in 1948 in order to carry on a private consulting practice and live in California. He gave up his consulting practice in 1951 (until 1952) to join Narmco Resins & Coating Co., as vice president and director. He resumed his consulting practice in 1952.

General Latex Expands

General Latex & Chemical Corp., Cambridge, Mass., has announced that negotiations are under way for the construction of a new plant in Charlotte, N. C. The proposed plant, which will serve the textile industry in the tri-state area of North Carolina, South Carolina, and Virginia, will be a fully integrated operation with sales office, laboratory, and compounding facilities. The new construction is in keeping with the company's policy of locating its facilities in all its general sales areas.

The proposed site brings the number of General Latex plants in the United States and Canada to six. The company at present had plants at Cambridge, Mass.; Dalton, Ga.; Ashland, O.; Verdun, Montreal P.Q., Canada; and Brampton, Ont., Canada.

General Latex custom-compounds latices and imports natural latex produced by Harrison's & Crosfield (Malaya) Ltd. The company also acts as U. S. representative for Pliolite latices produced by The Goodyear Tire & Rubber Co., chemical division, Akron, O.

Form Carlew Affiliate

Cary Chemicals, Inc., New Brunswick and Flemington, N. J. and its Canadian sales representative, Lewis Specialties, Ltd., Montreal, P.Q., Canada, have formed a jointly owned affiliate, Carlew Chemicals, Ltd. The new Carlew plant will be located in St. Remi, P.Q., and will manufacture polyvinyl chloride compounds primarily for the wire and cable and general plastics extrusion industries in Canada. Additional facilities have been provided for the eventual production of other plastic and elastomeric compounds. Lewis Specialties will continue to sell Cary's Blacar PVC resins and other materials, as well as Carlew's new line of Polycar PVC compounds.

The officers of the new company are: W. B. Jonah, president and treasurer; K. B. Cary and G. F. Blasius, vice presidents; and J. J. Gadbois, secretary. Jonah is president of Lewis Specialties, Ltd.; Cary and Blasius are chairman of the board and president, respectively, of Cary Chemicals; and Gadbois is a member of the Montreal legal firm of Gadbois, Roy & Gadbois.

Dayton Rubber Division

Expanded sales and increased market potential for highly engineered molded rubber products have resulted in the formation of a molded products sales division of The Dayton Rubber Co., Dayton, O. The fabrication plant for the division is at Three Rivers, Mich. The division was formed because the increasingly higher standards for speed, power, and load limits of modern machinery are creating a growing market for precision molded products, according to the firm.

The division will market a wide range of natural and synthetic rubber industrial machine parts ranging from small bushings to gigantic rollers for steel mills. Future plans call for the development of new elastomers for special usage as well as continued industrial applications for precision parts, and research and development in the vibration control field.

In line with Dayton Rubber's product development program, the new division has available a fully equipped machine shop to produce extrusion dies as well as molds for product samples designed and machined to customer specifications.

J. J. Haher has been appointed product sales manager for the new division. He will be responsible for all sales and production liaison with other Dayton Rubber divisions in expanding sales potential for molded and mandrel-built products and new product development.

Tall Oil Fractionator

A new 3,000-ton-per-month unit for fractionating crude tall oil, a by-product of sulfate pulp mills, is in commercial production at Nitro, W. Va., after a record start-up, it was announced by Monsanto Chemical Co. and Emery Industries, Inc., coowners of the facility. Less than one month after the first charge of crude to the new tall oil refinery, it was reported to be operating at design rate and producing specification grade materials.

Operated by Monsanto at its plant location in Nitro, the jointly owned unit separates crude tall oil, barged from Florida mills of St. Regis Paper Co., into fractionated tall fatty acids for Emery and high-quality tall oil rosin for Monsanto. The result is a strongly integrated raw materials position for both companies, with Emery the nation's largest consumer of unsaturated fatty acids for dimer acid and other polybasic acids, and Monsanto the originator and a major producer of chemically fortified pale rosin size for the paper industry. The fractionated tall fatty acid also joins the complete line of fatty acids marketed by Emery.

Badger Mfg. Co. engineered and constructed the new unit, a continuous-flow design which includes such innovations as perforated trays and enlarged column midsections to minimize pressure drop, internal condensers for overhead vapors, and extensive instrumentation including a 70-point data logger.

New Fabric Tread Tire

A new high-speed aircraft tire that is said to outperform and outwear any other jet tire has been specified as standard equipment on the F-106 "Delta Dart" built by the Convair division of General Dynamics Corp. In extensive Air Force tests the new tire, produced by B. F. Goodrich Aviation Products Co., Akron, O., is claimed to have withstood the stress of high-speed takeoffs and landings which quickly destroyed other high-speed tires.

The new tire's performance is made possible by a new tread construction called Fabric Tread. In this construction plies of laminated nylon cord are built right into the rubber stock to equalize the modulus between tread and carcass. This arrangement reduces the heat usually generated when high-speed takeoffs or landings cause flexing between tread and carcass.

The new tire has a special dimpled tread design that permits more uniform distribution of the fabric in the tread, helps eliminate stress points in the tread, and gives extra resistance to cutting and chipping, according to the company.

Goodrich also announced another Fabric Tread tire which in tests on Lockheed Aircraft Corp.'s F-104 outlasted other jet tires five to one. This particular tire for the F-104 uses the Sinewave tread pattern to reduce the mass of rubber in which heat can build up.

NEWS BRIEFS

Columbia-Southern Chemical Corp. has begun construction of a large cement plant at Barberton, O., designed to produce 1,500,000 barrels of cement annually. This plant is scheduled for completion by December, 1959. The product will be marketed by the corporation's Columbia Cement sales group, with headquarters at Zanesville, O.

Pennsalt Chemicals of Canada, Ltd., dedicated a chemical specialties plant in Oakville, Ont., on June 24. It was the second official opening of a Pennsalt manufacturing and distribution operation outside the United States in less than a month. Industrial Quimica Pennsalt, S. A., a wholly owned subsidiary in Mexico, had its official opening on May 27 of a new chlorine-caustic plant at Santa Clara, a suburb of Mexico City. The new Oakville plant manufactures metal cleaners, phosphatizing chemicals, and drawing compounds for the metal fabricating industry; a line of B-K dairy farm and milk plant cleaners and sanitizers; and Pensal laundry alkalies. In addition, Sharples brand organics and other rubber chemicals manufactured by Pennsalt in the United States are distributed from the new plant.

B. F. Goodrich Aviation Products Co., Akron, O., has developed a simple system of pneumatic deicing that for the first time makes possible deicing equipment practical for light twin-engine airplanes. Entirely mechanical, the new system adds only 50 pounds to the weight of the plane—about one-half the weight of present deicing equipment. The system, moreover, is said to be economically installed. It operates on the principle of compressed air or inert gases which are released by the pilot as necessary to actuate deicers on the wings and tail. The compressed gas is stored in a unique ½-cubic-foot fiberglass sphere with a working pressure of 3,000 psi.

United States Rubber Co., New York, N. Y., has introduced three new lines of tire tread rubber for the fast-growing retread industry. They are: U. S. Royal Tread, U. S. Deluxe Tread, and Blue Seal Tread. The U. S. Royal line is made for every operating condition encountered by passenger cars, buses, on and off-the-road trucks, and off-the-road heavy-duty vehicles, as well as for airplanes and industrial vehicles. The U. S. Deluxe Tread is made for passenger-car and truck tires, and Blue Seal for passenger-car tires only.

National Aniline Division, Allied Chemical Corp., New York, N. Y., has made available a new type of snap-on thermal insulation, having a low k factor, excellent resistance to physical damage, and unusual resistance to chemicals and solvents. Based on Nacconate diisocyanates, the insulation is designed for service between —200° to 250° F. It is said to be ideal for all refrigeration work and low-pressure (5 psig) steam lines. Urethane insulation offers several other advantages. It does not fray, crumble, or break in handling: neither does it disintegrate when subjected to water or many other liquids. On drying, the insulation is as good as new. Another feature is that the insulation is preformed to fit pipelines and fittings. Its outside diameter is such that it will nest correctly with a second layer, in case heavier thicknesses of insulation are desired. The dual-layer procedure also permits staggering of joints to reduce heat loss to a minimum.

B. F. Goodrich Industrial Products Co., Akron, O., has announced a new rubber band that comes 2,500 more to a pound than previously. The lightweight but strong band was developed especially for handling bankers' monthly statements, as banks are numbered among the largest users of rubber bands. The new band width has been reduced to one thirty-second of an inch.

United States Rubber Co., New York, N. Y., has announced that its Fisk-Gillette tire division has been divided into two separate organizations. The two new divisions will have separate sales, marketing, and distribution organizations to provide for more concentrated merchandising effort and better customer service. John A. Boll, formerly sales manager for Fisk-Gillette, has been named sales manager of the new Gillette tire division. L. B. Lillie, former Fisk-Gillette assistant sales manager, is now sales manager of the Fisk tire division.

Friction Materials Standards Institute Inc., New York, N. Y., at its annual meeting on June 18 announced the election of the following officers for the year starting July 1: president, William J. Vachout, Molded Måterials Division, Carlisle Corp.; vice president, George S. Lamson, Thermoid Co.; treasurer, Robert B. Williams, The Russell Mfg. Co.; and secretary, Miss Harriet G. Duschek. Other members of the board of directors serving with these officers are: William H. Johnston, Atlas Asbestos Co.; Frederick C. Weyburne, Marshall-Eclipse Division, Bendix Aviation Corp.; Franklin A. Miller, Raybestos-Manhattan, Inc.; S. Arthur Smith, Silver Line Brake Lining Corp.; and Richard A. Riley, World Bestos.

Bakelite Co., division of Union Carbide Corp., Bound Brook, N. J. has put into effect a 40% reduction in price for trimethylolphenol, a new phenolic monomer. Increased production from pilot-plant quantities, based on 12 months of successful field tests, prompted the slash from 35¢ to 21¢ per pound in truckload quantities for this phenolic material. Marketed as a 70% aqueous solution, and designated BRLA-1030, this unique phenolic is now available from the company's Bound Brook plant. Based on current reports, present and potential uses for BRLA-1030 now include thermal insulation, bonding, starch and dextrin modification, coatings and adhesives, electrical grade laminates, beater additions in the pulp and paper field, curing agents for Novolaks, and bonding woods products.

Thiokol Chemical Corp., Trenton, N. J., has announced that its Longhorn division was recently awarded a contract of $17,922,498 for production of miscellaneous rocket engines. This contract covers production of solid propellant rocket engines at its Longhorn Ordnance Works, a government facility Thiokol operates under government contract. Engines now in production there include the Air Force Falcon, air-to-air missile, the Army's ground-to-air Nike Hercules, ground-to-ground Lacrosse, and the spinner engine for the Honest John. The Longhorn facilities have been operated by Thiokol since 1952. It was also recently announced that an expansion program of approximately $5,000,000 was authorized for additional buildings and facilities to enable the production of larger solid propellant rocket engines.

The Goodyear Tire & Rubber Co., Akron, O., has installed a colorfully animated exhibit showing the scope of the company and its various products, at the visitors' gallery of the New York Stock Exchange, New York, N. Y. Highlighted by the Goodyear symbol, "Tire Around the World," the exhibit has a slowly revolving spiral tape on which are listed 1957 financial facts about the company, and an edge-lighted world map showing location of the company's plants throughout the world.

The Firestone Tire & Rubber Co.'s chairman, Harvey S. Firestone, Jr., recently received a cablegram from Jim Rathmann, who won the world's fastest 500 mile race at Monza, Italy, in June. Rathmann cabled, "Thanks to Firestone tires I established a new world 500 mile record at Monza with an average speed of 166.720 miles per hour. I never made a pit stop during the entire race although my straightaway speeds were over 190 miles per hour."

B. F. Goodrich Chemical Co. has announced the expansion of its new Henry, Ill., general chemicals plant. The announcement coincides with the beginning of manufacturing operations at the recently completed plant to produce specialty organic chemicals for use in the petroleum, rubber, plastics and other industries. Purpose of the expansion is to provide facilities for the manufacture of an antiozonant chemical for use in the rubber and petroleum industries. Construction of the new addition will begin in September with the completion slated for spring of 1959. Present estimates call for an eventual ten per cent increase in personnel at the Henry plant to operate the new unit.

Wyandotte Chemicals Corp., Wyandotte, Mich., dedicated its new chemical manufacturing center south of Baton Rouge, La., on June 25 and announced that its new ethylene oxide-glycol plant already is producing at anticipated capacity and that the output of the plant has been sold for the balance of 1958 and well into 1959. The new plant is the first of two chemical plants which will make up Wyanddotte's Geismar (La.) Works. The first half of a 300-ton-per-day chlorine and 330-ton-per-day caustic soda plant is well under way, and the second half has been started.

Allis-Chalmers Mfg. Co., Milwaukee, Wis., is making a strong bid for applications once considered the prime area for enclosed motors with an encapsulated motor. By completely casting open-type motor stators in an epoxy resin, the firm has produced an addition to the Super-Seal line that features complete protection for the insulation system. Motor applications include the most severe conditions of outdoor and indoor service, i. e., cooling towers and chemical plant acid pumps. More specifically, encapsulated insulation systems can be used where moisture or contaminated atmospheres could destroy the effectiveness of conventional insulation system, previously protected by special enclosures. The epoxy system can be used at a considerable savings in initial motor investment, claims the manufacturer.

Nopco Chemical Co. and its subsidiary, Metasap Chemical Co., have moved their general offices to 60 Park Place, Newark, N. J. The new headquarters will accommodate the firm's executive, accounting, advertising, and sales departments. The transfer to Newark will now provide more facilities in Harrison, N. J., for Nopco's expanded laboratory activities, an essential factor in the extensive expansion program of the company. The firm's engineering, legal, production, purchasing, receiving, and shipping departments will also continue to operate at the Harrison plant.

News Briefs

B. F. Goodrich Industrial Products Co., Akron, O., has developed a white Koroseal (polyvinyl chloride) food-handling conveyor belt for bakeries and other food processing plants—as well as pharmaceutical firms where white may be a preferred color. The new belt is non-toxic and imparts no odor or taste to food products. It has a smooth, non-porous surface that resists flaking or checking and eliminates the danger of contamination of materials handled. Available in two- and three-ply construction, it is recommended for handling such materials as nuts, meats, greasy pans, and bakery products at temperatures up to 150° F.

American Extrusion Corp., Hightstown, N. J., has commenced production of high clarity thin gage polyethylene film, via a new, more efficient method, which is said to produce superior strength properties. A newly formed corporation with headquarters and manufacturing facilities at Hightstown, the company will initially concentrate its efforts on quality garment bag grade film in the $^4/_{10}$ to $^7/_{10}$ mil range. The new production technique employs Davis-Standard extruders. The process involves extruding tubular film with almost a non-existent waste factor, differing to some extent from the conventional blown method.

Precision Rubber Products Corp., Dayton, O., has announced the development of two new compounds which are said to increase the service temperature range of an O-ring and other seals. Precision Compound 17007, developed to fill special needs in all branches of industry and the military services, has a reported service temperature range of -45 to 500° F., with the possibility of an extension of this range. Compound 17017 was developed to meet the most severe of the military requirements for resilient elastomers. Both materials are said to have exceptionally low compression set at high temperatures, unusually low volume change, and resistance to a wide variety of destructive chemicals, exotic fuels, synthetic lubricants and hydraulic fluids.

Aske-Wood, Inc., Detroit, Mich., has announced a new wheel and tire trim accessory which is said to give black tires the white sidewall or colorwall look. A two-inch width of non-staining natural rubber surrounding a stainless steel rim supplies the white wall impression at about half the cost of a set of such tires, according to Aske-Wood. The rubber also comes in yellow, green, blue and red, giving it the ColorStrype name. Manufactured by the Ohio Rubber Co., ColorStrype has been adopted as a factory-authorized accessory (known as Style-Tone ColorWall) by Ford Motor Company of Canada.

Velsicol Chemical Corp.'s industrial chemicals division, Chicago, Ill., has established a New England office at 780 Beacon St., Boston, Mass. Harold Freedman, who has been representing the company in the area, will be in charge of the new office. In addition to selling Velsicol hydrocarbon resins, solvents, and other chemical products, he will provide technical service to the company's customers in the paint, rubber, and floor tile industries.

The B. F. Goodrich Co., at its research center in Brecksville, O., is operating a reinforced concrete rain-erosion test tower where erosion-resistant materials of rubber or rubber-like compounds are being tested. Materials of this type are needed for jet-age rubber de-icers and radome covers. Under the test conditions at 600 miles an hour, a fragile raindrop strikes with the muzzle velocity of a bullet fired from a .45-caliber pistol. The test rotor blade velocity is adjusted by a throttle at a control panel. The new test tower supplants a smaller facility for rain-erosion testing established at BFG's research center in 1950.

Rubbermaid Inc., Wooster, Ohio, has begun national distribution of its new style, one piece covering for automobile rear floors, called the Kover-All. Designed to fit all cars, the Kover-All is similar to the company's front floor StyleLiner, affording one piece underfoot protection for both passenger sides and the drive shaft hump as well. Nubbing underneath holds it in place. Heat molded for detail, luster, and definition, the Kover-All is available in red, blue, green, black, tan, brown, grey, white, light blue and light green.

Better Monkey Grip Co., Dallas, Tex., has standardized on cardboard cores on which camelback tread rubber is rolled with Syl-off coated kraft paper for all the tread stock they distribute. Recently, one of their suppliers, Textile Paper Products Co., Crossett, Ark., furnished a few cores covered with kraft paper coated with Syl-off by Ludlow Papers, Inc., Homer, La. Syl-off, one of the new silicone paper coatings developed by Dow Corning Corp., Midland, Mich. effectively kept the camelback from adhering to the core.

American Rayon Institute, Inc., has recently opened a new office in the First National Tower Building, Main and Hill Streets, Akron, O. The office will serve as headquarters for George M. Sprowls, recently appointed technical director of the Institute. He is currently in charge of the Institute's continuing rayon tire cord research program and of a series of field tire testing programs now in progress in various locations in the United States.

Thiokol Chemical Corp., reaction motors division, Denville, N. J., has announced official completion of the basic development contract on a packaged liquid rocket powerplant two and a half months ahead of the contract requirement schedule. The Bureau of Aeronautics of the Department of the Navy has cognizance of the contract. The packaged powerplant is a unique new concept in liquid propellant rocket engines which can be maintained for extended periods in "ready" state. It is an integral unit including propellant tanks and thrust chambers and shipped with factory-loaded propellants.

The Society of the Plastics Industry, Inc., reinforced plastics division, will hold its 14th Annual Technical and Management Conference on February 3-5, 1959, at the Edgewater Beach Hotel, Chicago, Ill. According to program chairman James N. Grove of J. P. Stevens & Co., Inc., talks at the conference will stress new developments in raw materials, in processing, in the joining of reinforced plastics and in such major end-use fields as aircraft and missiles, commercial and military transportation, boating and tooling. The conference and attendant industry exhibit will be open to non-members as well as members of the SPI.

Tote System, Inc., Beatrice, Neb., manufacturer of bulk material handling equipment, has appointed L. E. Stewart & Son, Inc., 301 Quail St., Albany, N. Y. as upstate New York representative for the complete line of Tote bins, tilts, tanks, and accessory equipment. Tote's main product is the hermetically sealed, versatile Tote bin, capable of holding large amounts of bulk material and acting as shipping container, storage container, and self-discharge hopper. The standard bin is aluminum, but materials of construction can vary. The bins normally are fabricated in five sizes—42, 74, 90, 98, and 110 cubic feet. Other sizes are custom-engineered upon request.

Hewitt-Robins Inc., Stamford, Connecticut, has designed and manufactured a new man-carrying belt conveyor which has been installed in the Johnstown Coal & Coke Corp.'s coal mine at Panther Gulch, W. Va. The conveyor, 450 feet long and 26 inches wide, extends from the mine entrance down a 20-degree slope to the mining area, a 97-foot drop in altitude. The unique conveyor, called the Manveyor, is believed to be the first ever installed in a mine to carry personnel exclusively. It was installed in this coal pit instead of the conventional mine elevator running in a vertical shaft because engineering studies indicated it would be more economical and faster than an elevator.

Industry News

B. F. Goodrich Industrial Products Co., Akron, O., has completed a $700,000 expansion program, including construction of a new warehouse and additions to production facilities, at its plastic products plant in Marietta, O. The new warehouse adds 72,000 square feet of floor space to a plant that produces such Koroseal vinyl products as upholstery, wall covering, garden hose, rigid pipe and sheet, flexible material for rainwear, luggage, shower curtains, and a variety of other products. The new warehouse is expected to meet the challenge of an increasing demand for Koroseal products and will further centralize the company's shipping operations.

Michigan Chemical Corp. has announced the completion of plans for the construction of a new seawater magnesia plant at Port St. Joe, Fla., which will enlarge many times the company's present natural brine facility at Saint Louis, Mich. The new plant, with a design capacity of 125 to 150 tons a day and a subsequent enlargement to 300 tons, will provide industry with high-purity chemical and refractory grades of magnesium oxide for use in manufacturing basic brick and other refractory products, for rubber and neoprene, paper, textiles, ceramics, insulation and building materials, catalysts, and for many applications in chemical processes.

Hewitt-Robins, Inc., Stamford, Conn., has developed a new hose with increased flow capacity to speed the unloading of fuel from trucks into home storage tanks. The new hose has an inside diameter of 1⅜-inches, an increase of ⅛-inch over the old design, providing an increase in the flow rate of approximately 20% without adding any weight to the hose. Reinforced with high-tenacity rayon cord, the hose wall is thinner than before, yet will withstand working pressure of 150 psi., equal to previous constructions. An improved cover design is said to extend service life and to provide protection from abrasion, sun, weathering, and chemical action.

Sealol Winders Inc., newly formed subsidiary of Sealol Corp., Providence, R. I., has obtained exclusive rights to manufacture and sell Temco winders according to C. W. Williamson, president of Sealol Corp. Perfected in the early 1950's, Temco winders provide automatically controlled constant tension during winding operations in the paper, textile, rubber, plastic, wire, and metal industries. G. Duncan Briggs has been named manager of the Sealol division that will be responsible for manufacture and sales of all winding equipment. This division will operate under the supervision of Frank Bottomley, Sealol vice president.

Firestone Tire & Rubber Co.'s rubber plantations in the West African Republic of Liberia produced their one-billionth pound of rubber on July 9. Present at the ceremonies marking the event were B. H. Larabee, president of the Firestone Plantations Co.; Ross Wilson, who was present when the first pound of rubber was produced on the plantations and who retired on July 1 as vice president and general manager after serving 33 years with the company; and A. G. Lund, who succeeded Wilson as general manager in Liberia.

United States Rubber Co.'s Naugatuck Chemical Division, Naugatuck, Conn., is molding grass catchers from its Kralastic, a resin-rubber blend. The large vacuum-formed plastic containers are used as grass catchers on reel and rotary power lawn mowers manufactured by Jacobsen Mfg. Co., Racine, Wis. The plastic was selected for its moldability and ruggedness. The material is lightweight, rustproof, and tough.

The Surety Rubber Co., Carrollton, O., a leading manufacturer of natural, synthetic rubber and coated fabric work gloves, has announced the availability of Tractor Tread Griptite Neoprene industrial gloves with new Softex lining for greater hand comfort. Available in both gauntlet and the exclusive Surety Turn-Cuff styles, for added protection against liquids, the new gloves are produced in a complete size range—small (7-7½), medium (8-8½), large (9), and extra large (10-10½).

Mine Safety Appliances Co., Pittsburgh, Pa., is expanding the field sales and service organization of its technical products division to provide nationwide service on instruments and process control equipment. Nelson W. Hartz, sales manager of the division, has appointed a staff of specialists to serve all sections of the country. The staff is prepared to assist in the design and counsel on installation and maintenance of instruments and process controls for the chemical, petroleum, pharmaceutical, metallurgical, synthetic yarn, and food industries. H. B. Stafford is operations manager of the division.

Pennsalt Chemicals Corp.'s industrial chemicals regional office, formerly in Pittsburgh, Pa., has moved into new quarters at Natrona, Pa. The move will coordinate sales activities with plant facilities at the site of the firm's original plant on the Allegheny River, 21 miles north of Pittsburgh. John C. Hampson, newly appointed regional manager, replacing William P. Snelsire, who has retired, will be in charge of sales activities for Pennsalt organic and inorganic chemicals.

Wyandotte Chemical Corp.'s chemicals research and engineering division, Wyandotte, Mich., has announced the completion of expanded research facilities. The new construction includes laboratories, test cells, and supporting facilities which have the versatility to permit a wide range of corporate and Defense Department research projects dealing with high pressures and temperatures, and with toxic materials. According to J. W. Zabor, director of research, this expansion will permit an increased level of effort in the research and development of new fuels, lubricants, elastomers, and polymers.

The Military Clothing & Supply Agency, Philadelphia Quartermaster Depot, U. S. Army, Philadelphia Pa., plans to procure in the near future approximately 66,051 pairs of men's rubber gloves. Deliveries will be scheduled from December, 1958—May, 1959. This advance information, P-58-E-508, is furnished to assist industry in its planning for participation in this procurement. Specifications and all pertinent applicable conditions will be contained in the forthcoming invitation. Interested suppliers should contact the agency, attention: purchasing division, equipage branch.

Brown Rubber Co., Lafayette, Ind., is producing a trim strip for Studebaker-Packard Corp. A trim strip of vinyl foam with a textured integral skin outer layer fits on the rounded contour of the car door just below the window to make a soft arm rest when the window is lowered. The trim strip, which adds a note of unusual interest to the exterior of the car, is being added to the Packard Hawk automobile.

B. F. Goodrich Tire Co., Akron, O., plans to erect a modern new distribution center in Houston, Tex., to serve that area. Construction is expected to start some time in the fall. In addition to warehousing the Company's complete line of tires, the building will house zone and district offices. B. F. Goodrich Industrial Products Co. will also warehouse products in the building. The site was purchased from the Houston Belt & Terminal Railway Co., which will serve the warehouse when it is completed.

Firestone Rubber & Latex Products Co., Fall River, Mass., has been awarded a contract by the Military Clothing & Textile Supply Agency, Philadelphia Quartermaster Depot, U.S. Army, Philadelphia, Pa., covering mattress, bed, foam rubber padding, w/removable cover, 73 inches lg. by 24 inches w. by 4½ inches t., 26-lb. net wt. The contract is for 1045 mattresses, at a price range of $40.93-$41.63, for a total dollar value of $42,841.85.

NEWS about PEOPLE

Kenneth A. Kaufmann has been appointed to the newly created position of supervisor plastics market research and development at Amoco Chemicals Corp., Chicago, Ill. He comes to Amoco from Spencer Chemical Co., where he was manager of plastics technical service and the sales service laboratory.

F. Dudley Chittenden has been appointed to the new post of manager of Marvinol operations for the Naugatuck Chemical Division, United States Rubber Co., Naugatuck, Conn. **D. L. McCollum** succeeds Chittenden as division production manager; while **J. Nelson Judy** replaces McCollum as sales-production-coordination manager. In 1951, McCollum became technical assistant to the division production manager, and he left this post to coordinate sales and production. Judy was named general superintendent of the synthetic rubber plant in Naugatuck in 1956.

Daniel P. Shannon has been transferred to the new chemicals marketing group of Union Carbide Chemicals Co., division of Union Carbide Corp., New York, N. Y. In his new position he will be responsible for promoting sales of certain groups of newly introduced alcohols, aldehydes, and acids. Prior to his transfer, he was a technical representative in the Chicago district.

Leslie G. Wrigley has been appointed to the new position of sales manager of automotive sales for the textile division of United States Rubber Co., New York, N. Y. Also **Benjamin E. Ferguson** has been named product development manager of automotive sales for the textile division. Both Wrigley and Ferguson will be located in the company's office in the new center building in Detroit, Mich.

William A. Baltzell, formerly assistant sales manager, has been appointed industrial sales manager for Oakite Products, Inc., New York, N. Y., now in its 50th year as manufacturers of industrial cleaning and metal treating materials. In his new position he will be responsible for the work of the company's 17 divisions and 240 technical service representatives throughout the United States and Canada.

Jerome Taylor has been elected secretary and general counsel at a recent meeting of the directors of Goodrich-Gulf Chemicals, Inc., Cleveland, O. He will headquarter in the company's offices in Cleveland.

Floyd A. Yocke has been promoted to manager of camelback and repair material sales for The General Tire & Rubber Co., Akron, O. The former Akron division manager of truck tire sales joined General Tire over 12 years ago and has had experience in production, operations, adjustment and territory sales.

Wesley S. Coe has been named director of research and development for the Naugatuck Chemical Division, United States Rubber Co., Naugatuck, Conn. He replaces **D. Lorin Schoene** recently appointed an assistant director of research and development for the rubber company. In his new post Dr. Coe, formerly product manager of synthetic rubber, reclaim rubber, and latex compounds will supervise all research and development work at the Division's main research laboratory in Naugatuck Conn., at its experimental farm in Bethany, Conn., and at laboratories in its production plants at Baton Rouge, La., Painsville, O., Los Angeles, Calif., and Gastonia, N. C.

J. W. McCarthy has been named technical service representative for the marketing department, Jefferson Chemical Co., New York, N. Y. He will be responsible for servicing customer accounts and assisting in maintaining and developing market outlets. He will report to **J. K. Goerner,** manager, specialty products. McCarthy is transferring from Jefferson's manufacturing department, where he was a process engineer for the past year.

Edward R. Nauman becomes general manager of the Longhorn Division, Thiokol Chemical Corp., Marshall, Tex. Formal ratification of the appointment was received from Lt. Col. John E. Harrison, commanding officer of the Longhorn Ordnance Works. Acting general manager for the past month, Nauman succeeds the late W. R. Ignatius.

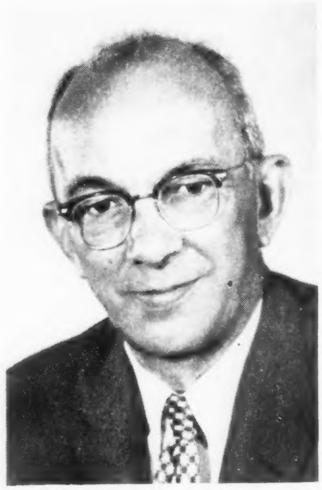
G. John Lambillotte becomes assistant to the general traffic manager for Columbia-Southern Chemical Corp., Pittsburgh, Pa. Prior to his appointment he had served as project engineer since his transfer to the Pittsburgh office in 1956 from the firm's Barberton, O., plant.

Robert E. Workman, former manager of the chemical division of Goodyear International Corp., a subsidiary of The Goodyear Tire & Rubber Co., Akron, O., has been appointed to the newly created post of assistant general manager of the Goodyear chemical division. Workman, who has been on leave of absence the past year while participating in the executive development program at Massachusetts Institute of Technology under a Sloan Fellowship, was awarded a Master of Science degree for his work there. He returned to take up his new duties on July 1.

Wesley S. Coe

Robert E. Workman

A. J. Weith, Jr.



T. B. Crowell

John H. Drexler III

A. J. Weith, Jr., commercial development manager for the organic chemicals division, American Cyanamid Co., Stamford, Conn., has been named industry advisor to the chemical and rubber division of the Business and Defense Services Administration, U. S. Department of Commerce, Washington, D. C. Dr. Weith has been with Cyanamid since 1947 when he joined the company as a research chemist. He has been departmental sales manager in the petrochemicals department of organic chemicals division since 1956.

T. B. Crowell, at a recent meeting of the board of directors of the Copolymer Rubber & Chemical Corp., Baton Rouge, La., was elected executive vice president. Also elected were **Paul G. Carpenter,** vice president, research and development; and **C. M. McKay,** vice president, production. Before joining Copolymer in 1943, Crowell was employed by the American Cyanamid Co., Elizabeth, N. J. He was named vice president on June 1, 1957. From Phillips Petroleum Co., as manager of production research and later as manager of the synthetic rubber branch, Dr. Carpenter joined Copolymer in 1956 as director of research and development. Before joining Copolymer, McKay worked for several companies including Trojan Powder Co., Allentown, Pa., and Ethyl Corp., Baton Rouge, La. After joining Copolymer he became chief engineer and has been production manager during the past year.

Ralph L. Haney has been appointed manager of the Philadelphia, Pa., district and **Charles E. Dandois** appointed manager of the Allentown, Pa., district of Allis-Chalmers Industries Group. At Philadelphia, Haney succeeds **C. W. Parker, Jr.,** recently named director of sales promotion for the Group.

L. A. Woerner

Ferdinand Vogel

William Naden

John H. Drexler III, former special representative in Germany for The Goodyear Tire & Rubber Co.'s International Corp. Chemical Division, has returned to the company's domestic organization and will be special representative in the chemical division's Philadelphia, Pa. district. Prior to his foreign assignment, he was a technical representative for the Goodyear chemical division with offices in Cleveland, O., and New York, N. Y. In his new post, he will be concerned primarily with the paint industry and the Pliolite S-5 and VT resins, and Pliolite latices produced by Goodyear for that field.

L. A. Woerner has been appointed vice president, technical, of the Automotive Rubber Co., Detroit, Mich. During World War II, he was technical coordinator for the Goodyear Tire & Rubber Co. and served in the manufacture of synthetic rubber on three Government Committees. He was on loan to R.F.C. as assistant manager of its research and development section, Office of Rubber Reserve. He joined the ARco organization in 1954 as technical assistant to the company's president, Tim G. Meulenberg.

William Naden has been elected president of Esso Standard Oil Co., New York, N. Y., effective August 1. He joined the company in 1927 as a chemist in the Everett (Mass.) refinery, and became general superintendent of that plant in 1934. In 1943, he had a similar capacity at Esso's Baltimore, Md. refinery. Accepting a wartime Government assignment in 1944, he served as director of refining for District I of the Petroleum Administration for War. Following this assignment he returned to Esso as manager of employee relations and was elected a director in 1946. He was elected a vice president in 1950, and became executive vice president in 1955.

Caesar A. Ricci

A. R. Merritt

L. P. Thies

Caesar A. Ricci recently joined Pennsylvania Industrial Chemical Corp.'s New Orleans, La., district office. He will work out of the firm's Dallas, Tex., sales residency.

Stanley C. Hope, president of Esso Standard Oil Co., New York, N. Y., since 1949, has announced that he will retire from the company at an early date. He will devote a considerable portion of his time in the future to highway safety, a field in which he has been active in the past through Esso Safety Foundation. He is a director of the National Safety Council, vice chairman of the Automotive Safety Foundation, and a member of the Council of the Bureau of Highway Traffic at Yale University. He is also national vice president of the National Association of Manufacturers and a director of the American Management Association.

John W. Mayers has been advanced to the position of chief engineer of the Pittsburgh Coke & Chemical Co., Pittsburgh, Pa., and will be responsible for all design, construction, and engineering activities of the company's plant facili ies. He was formerly plant engineer of the chemicals division of the company.

John C. Hampson has been appointed regional manager of the Pittsburgh, Pa., office of the Pennsalt Chemicals Corporation Industrial Division. He replaces **William P. Snelsire,** well known in the Pittsburgh area, who retires after 43 years' service with Pennsalt. Hampson, who has been assistant regional manager since January, 1957, has had a 22-year career with Pennsalt in dairy and food processing sales, metal processing sales, and industrial chemicals sales and supervision.

L. E. Stanton

John C. Hampson

A. R. Merritt has been appointed district manager in the Hartford, Conn., district; **L. P. Thies,** district manager in the Detroit, Mich., district; and **L. E. Stanton,** district manager in the Houston, Tex., district, to coordinate more effectively direct field activities of the chemical division of The Goodyear Tire & Rubber Co., Akron, O. The Goodyear chemical division, with 15 field offices throughout the country, markets high polymer resins, rubbers and latices to the rubber, plastics, paint, paper and textile industries. Complete sales and technical service for all products will be available from the new district offices.

Charles K. Murray has been appointed supervisor of export sales for the Texas-U. S. Chemical Co., New York, N. Y. He was formerly assistant director of market research for a Montreal, Canada, firm of chemical engineers and market consultants. In his new post he will handle all international sales of Texas-U. S. synthetic rubber, making his headquarters at the firm's office at 260 Madison Ave., New York, N. Y. Domestic sales of Synpol (SBR) rubbers will continue to be handled by the Naugatuck Chemical Division, United States Rubber Co., Naugatuck, Conn.

Ernest O. Tucker and **Grover C. Royston** have joined the research department of Copolymer Rubber & Chemical Corp., Baton Rouge, La., as chemists. Other personnel appointments to the technical staff include: **Kenneth Wirth,** development laboratory supervisor, development department; **Rodney J. McGarry,** chemical engineer, development department; **Wm. D. Butler,** chemist, development department; **Robert Argrave,** chemical engineer, technical department; and **Grant C. Rickard,** technical sales, sales department.

H. D. Allick

H. D. Allick has been named manager of the plastics department for The Goodyear Tire & Rubber Co.'s chemical division, Akron, O. He replaces **A. E. Polson,** who has resigned from the company. In his new position, Allick will be responsible for sales of Goodyear's line of Pliovic resins for the plastics industry.

Miss Anne Lea Nicholson, head of the technical library at Pennsalt Chemicals Corp.'s research and development laboratories, Philadelphia, Pa., for the past 12 years, has been elected treasurer of the Special Libraries Association. Her term of two years in this office began June 13. The Association is a national body whose 4,800 members are engaged in library and related intelligence activities in various technical, social, and art fields. Prior to joining Pennsalt, she was librarian for the Naugatuck Chemical Division United States Rubber Co., for nine years.

Charles W. Parker, Jr., formerly manager of the company's Philadelphia, Pa., district, has been named to the newly created position of director of sales promotion in Allis-Chalmers Industries Divisions, Milwaukee, Wis. **A. R. Tofte,** formerly manager of the advertising and industrial press department, was named manager of the publications and industrial press department of the new organization. J. **W. Murphy,** formerly assistant manager of the advertising and industrial press department, is manager of the new advertising department.

Malcolm D. Link has been appointed superintendent of The Goodyear Tire & Rubber Co.'s textile mill at Rockmart, Ga. He replaces **P. W. Beggs,** who has retired at 68 after having served 38 years with Goodyear.

Thomas L. Wilson has been appointed manager of the research center of United States Rubber Co., Wayne, N. J. Dr. Wilson replaces **Arthur E. Brooks,** who was recently named an assistant director of the research and development department. In his new assignment Wilson will manage the company's multi-million dollar research center opened last year in Wayne. He was previously administrative assistant to the director of research and development since 1954.

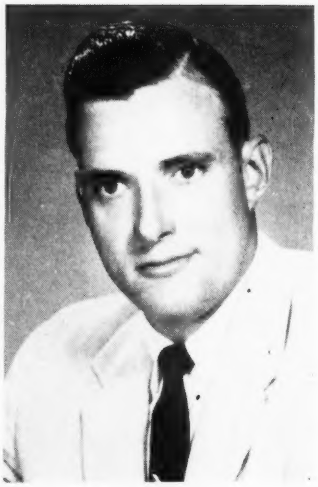
Warren Kay Vantine

Thomas L. Wilson

A. A. Watson has been named manager—marketing and assemblies and component sales—for the distribution assemblies department of General Electric Co., Plainville, Conn. **R. C. Wilson** was appointed manager—manufacturing and plant operations—for the same department.

Clarence Bremer formerly director of research has been appointed technical director of Oakite Products, Inc., New York, N. Y. manufacturer of industrial cleaning and metal treating materials. Dr. Bremer will be responsible for the company's research and product development, and technical service laboratories.

Paul T. Whitmire and **Richard W. Tannehill** have been named technical general foremen at the Akron, O., chemical plant of B. F. Goodrich Chemical Co. Whitmire will be foreman of the general chemicals section; while Tannehill succeeds Whitmire as foreman in charge of technical activities at the Hycar nitrile rubber facilities of the plant. For the past six months Tannehill has been on a special assignment in charge of product shipments from the plant. Whitmire has been technical foreman of the Hycar plant since March, 1955.



James M. Jones

James M. Jones has joined the St. Joseph Lead Co. as a zinc oxide sales representative. His headquarters will be at the company's New York, N. Y., office, and his territorial assignment will consist of Metropolitan New York, southern Connecticut, and eastern New York State, where he will promote the sales of the firm's zinc oxides to all consuming industries. He was previously a sales representative for the Goodyear Tire & Rubber Co.'s chemical division in the rubber, plastics, textile, and paper industries.

Robert L. Girton, who joined The Firestone Tire & Rubber Co. in 1951 as an assistant foreman, was recently named production manager of the company's Plant 1 in Akron, O. He will be in charge of the production of truck, tractor, airplane, and giant off-the-highway tires in the headquarters plant. He formerly was division manager of material preparation in Plant 1. **R. A. Black** has been appointed to fill the post vacated by Girton; while **T. E. Judy** will manage the calendering room, stock cutting and bead department.

A. James Skey has been appointed marketing representative for Amoco Chemicals Corp., Chicago, Ill., and is now permanently located in London, England. Before joining Amoco, Dr. Skey was associated with the British Oxygen Company in London.

James P. Drury has been appointed manager of production analysis and control for Seiberling Rubber Co., Akron, O. In his new position, he will be responsible for factory scheduling operations, receiving and production analysis. He has been superintendent of automobile floor mat production since January. Before that he had been production control manager of the company's tire division.


N. Y. Times

E. B. Brooks


Lubitsh & Bungarz

Neil L. Catton


Photo Art Studio

Donald V. Sarbach

E. B. Brooks has been elected a vice president of the Columbian Carbon Co., New York, N. Y., and will be in charge of the company's carbon black and pigment division, a post formerly held by Columbian Vice President **A. Harvitt,** who is retiring. Brooks joined Columbian in 1955 as general sales manager and is currently a director and president of Columbian Carbon International Inc.

Neil L. Catton and **Alfred J. Northam** have been appointed assistant product sales managers for the elastomer chemicals department, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. Catton will be responsible for neoprene and Northam for Hypalon synthetic rubber. They had most recently been in charge of sales development for these products. The careers of both men have spanned more than three decades and have established them as authorities on various phases of the rubber industry.

W. H. Burns has been promoted to the position of Eastern regional manager, resins and solvents division, Velsicol Chemical Corp., New York, N. Y. This post has been created as a part of a general expansion of the firm's sales and service facilities in the Eastern area. He brings to this position experience gained in nine years as a product development chemist as Eastern sales representative for Velsicol. He will continue to headquarter at his present address, 350 Fifth Ave., New York, N. Y.

Edward F. Steinkerchner has been advanced to the position of technical sales representative for The General Tire & Rubber Co., Akron, O. He has been with General Tire since 1957 in the chemical division.


Alfred J. Northam


Edward F. Steinkerchner

Donald V. Sarbach becomes director of new product development for Goodrich-Gulf Chemicals, Inc., Cleveland, O. Previously he was with Hewitt-Robins, Inc., Stamford, Conn., where he was director of research. In his new position he will set up a laboratory for Goodrich Gulf at its Institute, W. Va., plant where he will headquarter his operation to serve all the firm's customers in the development of new product applications.

Robert J. Kingsley has been named to the newly created position of general sales manager for the Pacific Division of the Nopco Chemical Co., with sales and production headquarters at Richmond, Calif. As general sales manager, he will be in charge of the new expanded sales program and the administration and direction of sales efforts for all of the company's sales divisions in the 11 western states. Nopco produces industrial chemicals such as plasticizers, vinyl stabilizers, lubricants, and polyvinyl acetate emulsions for a wide variety of industries.

Kenneth C. Lippmann has been appointed manager of transportation of The New Jersey Zinc Co., New York, N. Y., succeeding **K. L. R. Baird,** general traffic manager, who retired August 1. Lippmann, a veteran of more than 30 years' service with the company, has been associated with the traffic department since 1929. He was named assistant to general traffic manager in 1946.

Paul A. Day has been appointed controller for The General Tire & Rubber Co.'s Odessa, Tex., synthetic rubber facility. He has been associated with the firm's chemical division since 1956.

(*Continued on page 797*)

NEWS from ABROAD

Malaya

Red China Complains About Rubber Quality

A few shortsighted merchants in Malaya are jeopardizing the promising market for Malayan rubber that could be developed in Communist China, the representative of an important firm of local rubber exporters warned the Federation Rubber Traders' Association at a recent meeting. He had just returned from a tour of China undertaken with an eye to possible expansion of rubber business between that country and Malaya.

Latest official statistics show that in the first five months of 1958, China bought 33,054 tons of Malayan rubber, against 95 tons in the same period last year. During the latter part of the 1958 period, however, sales fell off, and there were reportedly cancellations of Red China orders because of poor quality. The China Importers & Exporters Corp. has written to the Rubber Trade Association of Singapore complaining that the quality of rubber from Malaya has deteriorated from year to year since 1956. It is claimed that the inferior quality of the rubber is hurting production in China and that manufacturers there will be forced to cut their purchases from Malaya if there is no improvement in the rubber received.

In Malaya it was explained that the trouble was due to the fact that rubber manufacturers in China often got their rubber through middlemen who in turn obtain cheap supplies from packers.

The Federation Rubber Traders' Association intends to send a delegation of ten men to Peking to investigate complaints and to try to convince Chinese manufacturers that they would be sure of getting better quality if they bought rubber direct from the packers at a somewhat higher price.

Incidentally, plans are afoot to form a single body, the Rubber Traders' Association of Malaya and Singapore, to represent the rubber traders in the Federation and in Singapore and replace the existing organizations, the Federation Rubber Traders' Association and the Singapore Rubber Traders' Association.

Rubber Study Group

To nobody's surprise, the Rubber Study Group meeting ended without action on international price stabilization. The local press learns that while most of the rubber-producing countries favored some kind of scheme, no practicable method had been offered. No great disappointment seems to have been felt on this score in Malayan rubber circles, but Indonesia and Ceylon are said to have been more ready to welcome a plan.

The report on the cause of price fluctuation presented to the Group in Hamburg by P. F. Adams, Secretary for Commerce & Industry, who headed the Malayan delegation, is understood to have been very well received. No details have as yet been published on this report, and there is, quite understandably, much curiosity about it here, to say the least.

On his return to Malaya, Mr. Adams did reveal that 1958 natural rubber production was estimated at 1,920,000 tons, against consumption of 1,915,000 tons, and he commented that if the estimate were correct, there was no reason why there should be any serious fall in the price of rubber.

Figures released by the government early in July show an increase of 11½% in the rubber exports from Malaya in the first half of 1958, as compared with exports in the same period last year. The total, 523,255 tons, was the highest shipped from here in the first half of any year since 1951, when the Korean war sent exports up to 621,684 tons. While the export total for the first half of this year was gratifying, the average price, f.o.b., was less so and at 76.25 cents (Straits currency) showed a drop of almost 16 cents per pound, as compared with the average for the first half of 1957.

Wage Dispute Still On

For a moment it looked as though the then four-month wage dispute was to find a happy solution when a report was published June 9 to the effect that a wage agreement, based on productivity and valid for two years, was imminent. Unfortunately the announcement proved erroneous and the news, early in July—almost a month later—indicates that the stalemate in negotiations between the owners and the Union continues.

A meeting scheduled for June 27 broke down when the owners' association, the MPIE, rejected a proposal by the Union for an interim wage. The MPIE later stated that the Union's motion was "no more than a blatant attempt to obtain an unjustified increase in wages." The Union then apparently decided to adopt a hard policy and reportedly was considering whether its action should take the form of an all-out strike of plantation workers, go-slow action, or a repetition of sudden strikes. At this stage the government intervened again and persuaded the Union to postpone a strike discussion. There, for the present the matter seems to rest.

Prospects

The prospects of Malaya regaining her position as Number One producer of natural rubber are from time to time considered here. Recently the matter was referred to again by a government official who stated that he saw no reason why this should not take place by 1965, if things continue as they are. By that time Malaya should be outstripping Indonesia whose output has been slipping. In 1951 that territory produced 814,000 tons of rubber, against Malaya's 605,000 tons; but in 1957 the comparative figures were 684,000 tons for Indonesia and 638,000 tons for Malaya. If Malaya is able to continue expanding the high-yielding acreage by judicious replanting and Indonesia continues to be torn by political upheavals, and there is large destruction of rubber trees, the forecast could become fact sooner than 1965.

South Africa

Rubber Industry Growth Accelerating Rapidly

Activity in the South African tire industry reportedly continued at a high level during 1957; a feature of the local market was the growing popularity of the tubeless tire which was said to have accounted for about 50% of the sales of tires here.

Pronouncements by heads of the leading tire manufacturers draw attention to the growth of the individual firms, and with it, of the industry here. Firestone S.A., (Pty) Ltd., Port Elizabeth, which opened its factory in 1936 with a staff of 400, in 1957 employed 1,400 persons; while the factory floor space meanwhile increased to three times the original area. This factory is

now in a position to equip almost any type of rubber-tired vehicle in normal use in South Africa.

The Goodyear Tire & Rubber Co. (S.A.), Ltd., seems to be particularly optimistic about the economic future of South Africa and as proof of its confidence in the country points to its factory at Uitenhage which already represents an investment of £1,000,000 and is one of the largest in South Africa. It gives employment to 1,200 factory workers and executives.

Dunlop South Africa, Ltd., is erecting a new £1,500,000 factory for Bulawayo, Southern Rhodesia, expected to be in production early next year. About 500 persons, including 400 Africans, will be employed for this plant, intended to supply the market of Central African Federation and neighboring countries. Rubber from the company's Nigerian plantation will be used.

Last year Dunlop Industrial Products Division was formed to coordinate all the mechanical products made in the Durban and Benoni factories as well as those received from the British works. The articles include conveyor and transmission belting, V-belts, hose, rubber-lined articles, and a variety of components for the engineering industry.

Incidentally, the local Dunlop organization recently supplied a newly opened dolomite quarry with a system of conveyor belting installed between the primary and secondary crushers and the washing plant. This system consists of two 42-inch wide belts which cover a total distance of 4,200 feet and raise the material to a total height of 495 feet.

The General Tire & Rubber Co. (S.A.), Ltd., continued to increase its business in 1956 despite various difficulties, partly caused by extensions to buildings at the Port Elizabeth plant and the installation of equipment. These extensions have meantime been completed and are in full operation.

Manufacturers of general rubber goods in South Africa, especially around and in Johannesburg, are also showing enterprise and are venturing into new fields. One firm recently began to make surgeon's rubber gloves, which are claimed to have better mechanical properties and resistance to sterilization than similar imported articles.

Rubberized hair, sold under the trade mark Rubbalok and formerly imported, is now being produced here by another Johannesburg firm. Imported Rubbalok seems to have had relatively little attraction for South African upholsterers and other potential users, but since local manufacture was started, and the material became readily available, there has been a marked increase in interest.

A hard rubber molded screen for drum filters was designed (by still another firm in this area) to replace cedar or soft pine filter screens used in the South African mines. The rubber screens are cheaper than those made of cedar and are more easily cleaned than either type of wooden screen.

Mention may also be made of leather footwear made with rubber soles vulcanized on to the uppers and of a metal squeegee-type broom with replaceable rubber blades. These brooms are intended to remove water from concrete surfaces in factories and yards of houses and the like, and are said to be finding ready sale in South Africa; American importers are also said to be interested in them.

Sasolwax for Rubber and Plastic Industries

A new wax for the rubber and plastics industries is being produced and exported by the state-owned South African Coal, Oil & Gas Corp., Sasolburg. Known as Sasolwax, the material is made from coal by the Fischer-Tropsch process; it is a pure white, refined fraction of aliphatic hydrocarbon with average molecular weight about 750, melting point 210° F., variation of hardness with temperature approaching that of a carnauba wax, and fine crystal structure rather similar to that of microcrystalline wax. Price in the United Kingdom is £164-£168 per ton.

In rubber processing, the wax serves to improve lubrication, mold release, gloss and surface finish, and is claimed to be useful also to produce a tougher compound. It is a processing aid for polyvinyl chloride and polystyrene, reducing mold flow and in some cases also mold temperature; compatibility with polyethylene is very good; it improves vapor and gas permeability.

Italy

Stereoisometric Elastomers

Stereoisometric techniques are now being applied by Montecatini to the production of elastomers from petroleum by-products, Engineer Piero Giustiniani revealed in a press conference held April 14. At the Ferrara factory, vehicles are already running on experimental tires made from these stereoisometric elastomers. Giustiniani also mentioned that the polypropylene fibers the company is now working on have some of the qualities and the handle of wool and cotton. Studies are in progress on the problem of dyeing the propylene fiber, particularly mixtures of this fiber and cotton or wool. Turning to the polypropylene plastic, Moplen, he predicted that since it can be used for conveying fluids at temperatures up to 120-130° C, it would largely displace metal pipe for hot and cold water.

Pirelli Life Rafts

The Ministry of the Italian Mercantile Marine recently approved for use on merchant vessels, fishing and pleasure craft, four types of inflatable life rafts built by the Pirelli company, Milan. These include three models shaped like regular boats, seating six, ten, and 20 persons, respectively, and a circular raft for 20 persons. The advantages claimed for the latter construction are, among others, that it provides more room, has greater stability, and can easily be noticed from a height.

Inflation is automatic. The uninflated raft comes in a casing provided with a kind of rip-cord with grappling hook at one end for gripping the ship. When the raft is thrown into the sea, the downward plunge stretches the cord, causing the casing to open while at the same time the pin of a cylinder of carbon dioxide in the casing is released. Inflation begins immediately and is completed in about one minute. All styles produced can be fitted with protective coverings against inclement weather.

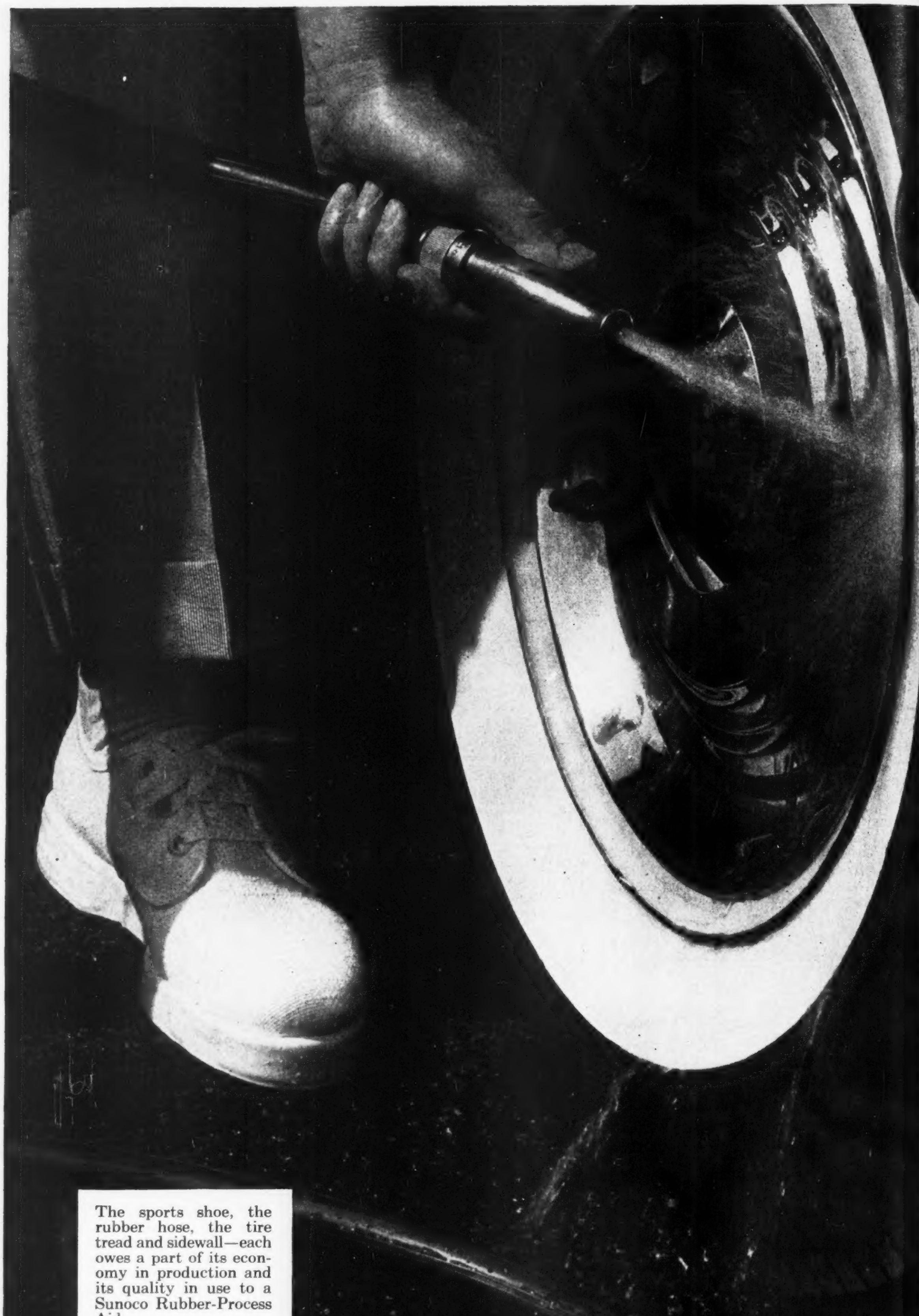
More Polypropylene

Encouraged by the great interest shown in its Moplen, polypropylene, and the demand for it in Italy and other countries, Montecatini is to raise annual capacity of the plant at Ferrara from the present 15 million pounds to 45 million pounds, by next year; a new and improved process will then be used.

Ceylon

A Russian trade mission in Colombo early this year made various offers of aid to Ceylon. Russia proposed to provide technical assistance for increased food and natural rubber production, declaring herself ready to buy rubber directly from Ceylon on mutually beneficial terms. She also offered to help Ceylon establish a factory for the manufacture of tires, tubes, and other rubber goods.

The result of the negotiations seems to be that Ceylon and the Soviet have agreed to an exchange of goods including, on the part of Ceylon, shipments of tea, rubber, and coconut products. Each of the countries involved will be given credit equivalent to about $850,000.



The sports shoe, the rubber hose, the tire tread and sidewall—each owes a part of its economy in production and its quality in use to a Sunoco Rubber-Process Aid.

Photo by A. DeLardi

Save money and gain quality on every batch with these SUNOCO RUBBER-PROCESS AIDS

The right combination of the *right* oil and the *right* technical service can begin working now to save you production money and give your products consistently better characteristics.

You can get easier processing, less staining of light-colored mechanical goods, smoother production—these benefits come from the use of Sun Rubber-Process Aids.

Ask your Sun representative or write us direct for a copy of the outstanding new booklet "A Graphic Method for Selecting Oils Used in Compounding and Extending Butadiene-Styrene Rubbers." Address your request to Dept. RW-8.


Photo by A. DeLardi


Photo courtesy H. K. Porter Company, Inc.

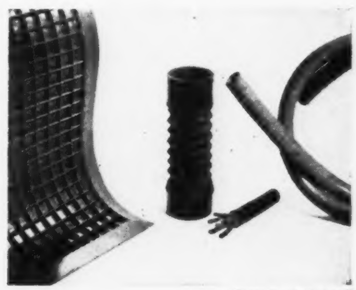


Photo by A. DeLardi

Whatever the end products—light-colored synthetic-natural combinations, conveyor belts, auto floor mats, refrigerator door gaskets, industrial and garden hose, sink stoppers—Sunoco Rubber-Process Aids improve processibility, improve physicals, save you money consistently.

IF YOU PROCESS	USE	BECAUSE
Light-colored oil-extended polymers (1703, 1708, etc.)	CIRCOSOL® NS	It combines superior nonstaining characteristics with best processibility, imparts good physicals. Primarily an extender.
Oil-extended polymers (1703, 1708, etc.)	CIRCOSOL 2XH	It's a general-purpose softener and extender for light-colored rubber goods, especially where optimum physicals are required.
Regular neoprenes, natural rubber, Hypalon (where color is a problem)	CIRCO® LIGHT	It's an ideal all-around moderate-priced plasticizer for nonstaining reclaims and butyl inner tubes, SBR, GN, W, WRT.
Oil-extended polymers (1705, 1710, etc.) and natural rubber, Hypalon (where color is no problem)	SUNDEX® 53	It's a double-distilled aromatic plasticizer for tire-tread stock, rubber footwear, matting, toys, semi-hard rubbers, high-Mooney WHV.
Black master-batch polymers 1706, 1711, 1712, etc.	SUNDEX 1585	It's a new highly aromatic plasticizer for tough polymers where easy processing is desired. This is a distilled process aid.
Natural rubber, SBR polymers, regular and WHV neoprenes, acrylonitrile polymers	SUNDEX 85	It's especially recommended for very high loadings of WHV neoprene (from 75 to over 100 parts Sundex 85 to 100 parts polymer). Used in hard rubber goods.

For further information and a list of Sun offices, consult Chemical Materials Catalog or Rubber Red Book.

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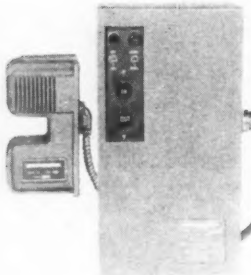
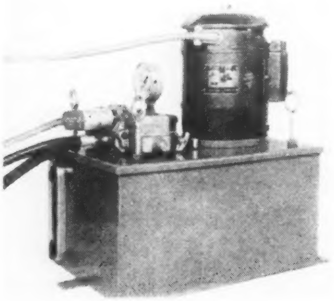
NEW EQUIPMENT

Edgetron Guide System





Components of Edgetron edge guide system: sensing head (top left); control device (top right); actuating mechanism (bottom)

An edge control system, called the Edgetron edge guide system, which provides accurate web and edge guiding in rubber and rubber product manufacturing is available from the Intercontinental Dynamics Corp., Englewood, N. J. The new system consists of three units: (1) the sensing head which contains two photoelectric cells positioned to detect out-of-position movement of the web; (2) the control device, which amplifies the signals and controls the actuating mechanism; and (3) the correction unit which uses either a hydraulic cylinder or an electric motor as actuating mechanism.

The system can be used in any winding or rewinding, slitting, doubling, or registering operation. Production set-ups for which it can be used include the hot stretch process lines in nylon tire fabric manufacturing, bias cutting of woven wire, nylon, or rayon tire fabrics, and in calendering operations of tire tread stock. Indications are that this edge control system will also improve the performance of polyethylene and other plastic extruders and laminators.

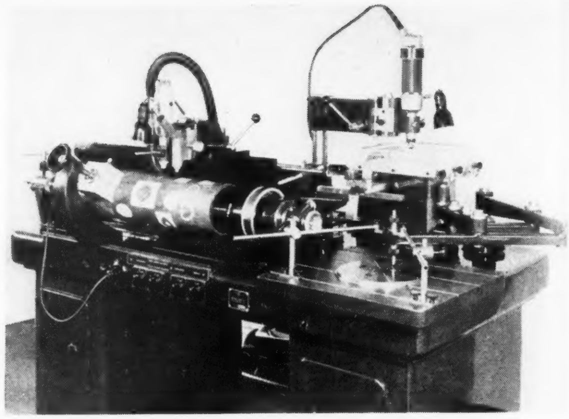
Easy installation and maintenance result from the basic simplicity of the system. Since it uses only electrical wiring and flexible hoses, it can be quickly shifted from one production line to another. The absence of rigid piping simplifies position changes to any machine.

Pantograph-Engraver

A new pantograph-type machine for engraving, inking, and/or printing rolls from a flat pattern has been developed by the German firm of Michael Kanph and is being distributed in the United States by The de Florez Co., Inc., Englewood Cliffs, N. J. The machine engraves rubber, plastic and copper rolls for printing or decorating paper, textiles, film, foil, plastics, rubber, or metal.

The highly accurate machine was originally designed for engraving rolls used in printing securities, and has been used to engrave inking rolls for printing multi-color U. S. stamps.

In using the machine, the design or art-work to be engraved is placed on the machine table, and as the arm of the pantograph



New rubber roll engraver

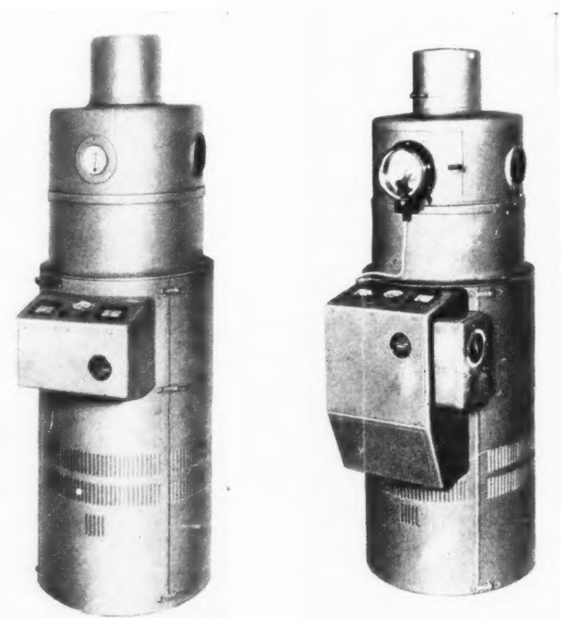
follows the design, a 45,000 rpm. cutting tool cuts away those areas of the roll surface not required in applying the design to the material to be printed. In the case of rubber rolls, spoiled areas may be vulcanized and re-engraved, according to the distributor.

Light-Fading Tester, Weathering Tester

G. F. Bush Associates, Princeton, N. J., is offering a new light-fading tester, Xenotest PL 393 model, which is a research, testing, and production control device for accelerating natural sunlight effects on all materials, coated and otherwise. Among such effects are fading, photochemical changes, and discoloration of textiles, papers, plastics, rubber, dyes, inks, paints, floor coverings, upholsteries, and finishes.

In the tester, specimens are exposed to filtered light from a centrally located xenon lamp, said to give excellent continuous reproduction of natural sunlight in intensity and spectrum. Light intensity at the sample is approximately 15,000 foot-candles. Two- by four-inch test specimens are mounted on one or both sides of 10 specimen holders on a frame rotating uni-

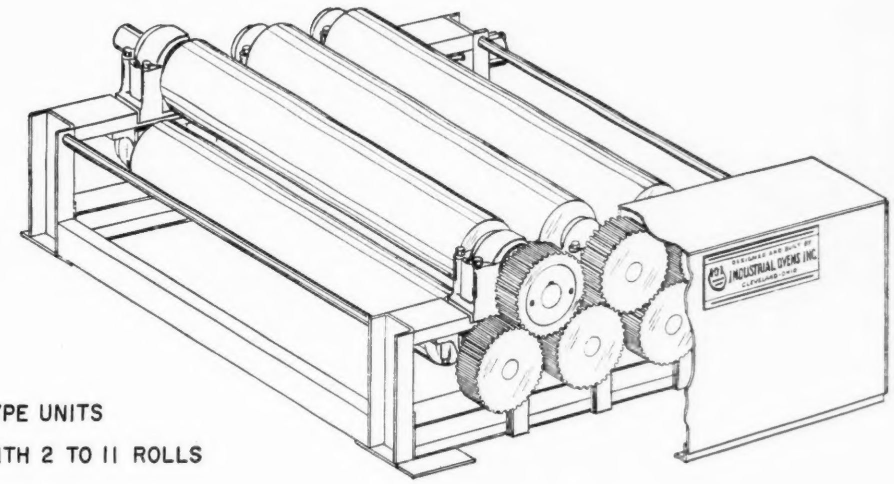
(*Continued on page 782*)



GFB light-fading tester (*left*) and weathering tester

TIRE FABRIC PROCESSING EQUIPMENT

PULL ROLLS



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MANY SATISFIED CUSTOMERS
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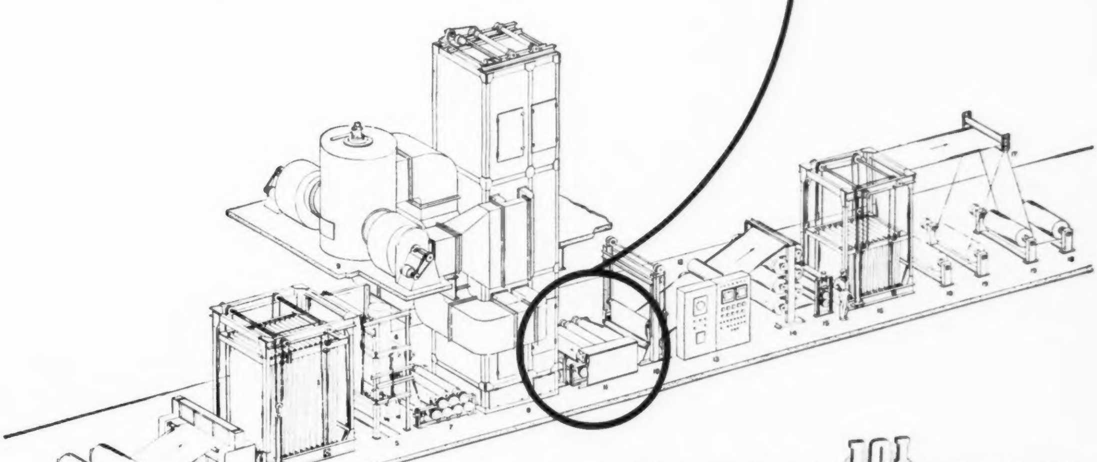

INDUSTRIAL OVENS, INC.
ENGINEERING VERSATILITY
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NEW MATERIALS

Hypalon 30

Hypalon 30 is a new chlorosulfonated derivative of polyethylene designed primarily for solution coatings on rigid substrates. It is said to be superior to Hypalon 20[1] in producing cured surfaces which are harder, drier, glossier, freer from drag, and more resistant to soiling, according to its manufacturer, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. Where low-temperature requirements are not severe, Hypalon 30 compounds may be used for applications such as coated fabrics, decorative coatings for extruded goods, or possibly floor tiling.

Hypalon 30 is said to be extremely weather resistant; colored compounds have excellent color stability on outdoor exposure. Although it is designed for application from solution, it may be processed in the same manner as Hypalon 20. Hypalon 30 is white in color, odorless, comes in chip form, has excellent storage stability, presents no health hazards, and differs from Hypalon 20 only in specific gravity. Specific gravity for Hypalon 30 is 1.28; for Hypalon 20, 1.12.

When Hypalon 30 is compounded similarly to Hypalon 20 in a coated fabric-type formulation, its vulcanizates compare with Hypalon 20 as follows:

Tensile strength	equal
Modulus	higher
Elongation	lower
Hardness	higher
Brittle point	higher
Resistance to ozone	equal
Weather	equal
Discoloration	equal
Soiling	better
Oil	better
Flame	better

In applications where flexing at low temperatures may be encountered, blends of Hypalon 20 and Hypalon 30 may be used to produce satisfactory low-temperature flexibility while retaining much of the improved surface properties and embossibility of the Hypalon 30 compounds. Hypalon 30 has improved resistance to oil as compared to Hypalon 20; whereas the latter should be used whenever outstanding resistance to acids is required.

A technical bulletin, Report No. 58-2, which gives viscosity data, various formulations, and physical properties, is available from the company.

[1] See RUBBER WORLD, Jan., 1957, p. 576.

SP-126 Phenolic Resin

The development of a new heat-reactive phenolic resin for use in neoprene adhesives has been announced by Schenectady Resins Division, Schenectady Varnish Co., Inc., Schenectady, N. Y. The new resin, designated SP-126, is claimed to make possible the production of solvent-type neoprene adhesives with the highest heat resistance yet available.

This property, combined with fast-drying and outstanding cohesive as well as adhesive properties, permits formulation of superior heat-resistant neoprene cements, according to the firm. Soluble in aromatic, aliphatic, and ketone solvents, SP-126 resin is said to be compatible with both neoprene and nitrile rubber. It is produced in lump form, has a melting point of 145-165° F., a specific gravity of 1.05-1.15, and a color rating of I - N, U.S.D.A. Rosin Standards.

In general, quantities up to 100 parts of SP-126 resin per 100 parts of rubber are used in formulations. An adhesive is made by mixing together solvent, premilled rubber and the resin, or by milling the resin in the rubber stock before cold cutting with solvent.

Neoprene solvent adhesives containing SP-126 resin are said to be useful for bonding glass, steel, and non-porous surfaces to themselves or to each other. Such adhesives are also used in the shoe industry for bonding shoe soles and in many other industrial applications. For all-purpose neoprene adhesives, where high heat resistance is not required, a companion resin, Schenectady SP-560 Terpene Phenolic, is used because of its lower cost and good performance, it is further reported by the manufacturer.

Polyco XP 24-97

Polyco XP 24-97 is a newly developed copolymer of styrene and butadiene made for use in baking finishes on metal surfaces. The latex forms a film by the customary mechanism of fusion of the particle of resin in the latex, but on baking at elevated temperatures converts to a hard, tough water- and alkali-resistant film with excellent adhesion to most substrates.

In the copolymerization of butadiene with styrene, the resulting copolymer still retains one double bond per unit, thus retaining a substantial degree of unsaturation. By means of metallic catalysts and elevated temperatures, cross-linking is produced, and the polymer is converted from a soft, tacky material to a dry, tough, solvent-resistant film. Polyco XP 24-97 lends itself readily to the formulation of metal primers and gloss finish coats, both for dip and spray application.

Typical physical properties of Polyco XP 24-97 are as follows:

% Solids by weight	46 ± 0.5
pH of latex	3.5 — 4.5
Weight per gallon of latex (lbs.)	8.4
Solids (lbs.)	8.5
Viscosity Brookfield (cps @ 25° C.)	less than 50
#4 Ford Cup (sec)	12 to 14
Average particle size (microns)	less than 0.2

A technical bulletin giving formulations and application data is available from the manufacturer, Polyco-Monomer Department, The Borden Chemical Co., New York, N. Y.

Light-Fading, Weathering Testers

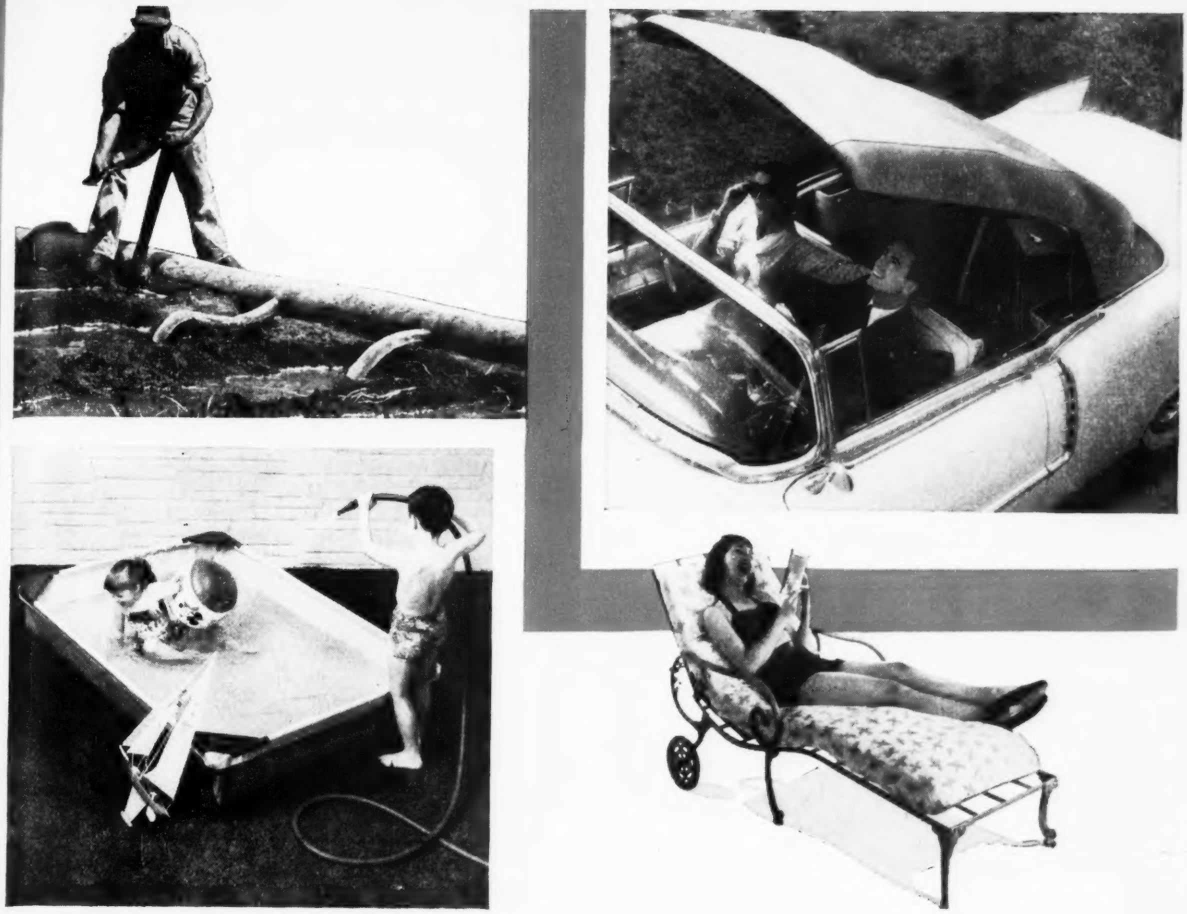
(Continued from page 780)

formly around the xenon lamp.

Other characteristics include: sample space temperature to 150 pom 2° F. indicated; humidity to 50% indicated; elapsed time indicated; 220/440 volts a.c. or d.c., one- to three-phase, 60-cycle for rated input of 4.5 kva and 2 kw consumption; weight 250 pounds gross; 21-inch diameter by 64 inches high; and cooling water required three pts./min. Available at additional cost is a gaseous atmosphere as in the GFB All-Weather Ozonator.

Also available is the GFB weathering tester, Xenotest WPL 394 model, which is a research, testing, and production control device for accelerating weathering effects of natural sunlight, humidity, rain, and temperature in any repeated program on all materials. Shape, size, general construction, operation, performance, and controls are approximately the same as for the light-fading tester; additional are controlled humidity and rain, including items such as pumps, reservoirs, nozzles, and piping, contact hygrometer and programming controls.

The characteristics are essentially equivalent to the light-fading tester, excepting that water consumption is 15 quarts daily; two quarts are added for each hour of rain; and air required is three cfm at 18 to 30 psi.



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NEW PRODUCTS

Vice President L. A. McQueen and General's D.C.L. Truck Tire

New D.C.L. Truck Tire

A new-design truck tire, with a 60% deeper than normal tread, has been announced by The General Tire & Rubber Co., Akron, O. Designed to deliver greater original and retread mileage and named the D.C.L. (Deep Cross Lug), the new highway tire, with its Nygen (nylon cord) carcass and wide flat contour, was evolved after years of research and development. Millions of miles of torture and durability tests have proved it out, according to the company.

One of the unique features of the D.C.L. tire is its tread. Halfway between the center and the shoulder it has a $^{29}/_{32}$-inch non-skid depth as against the $^{16}/_{32}$-inch center tread depth in a normal tire. A cross-lug design, the tread has a circumferential, running center rib with jagged, outrigger bars jutting out to the sidewalls at regular intervals for traction and stability.

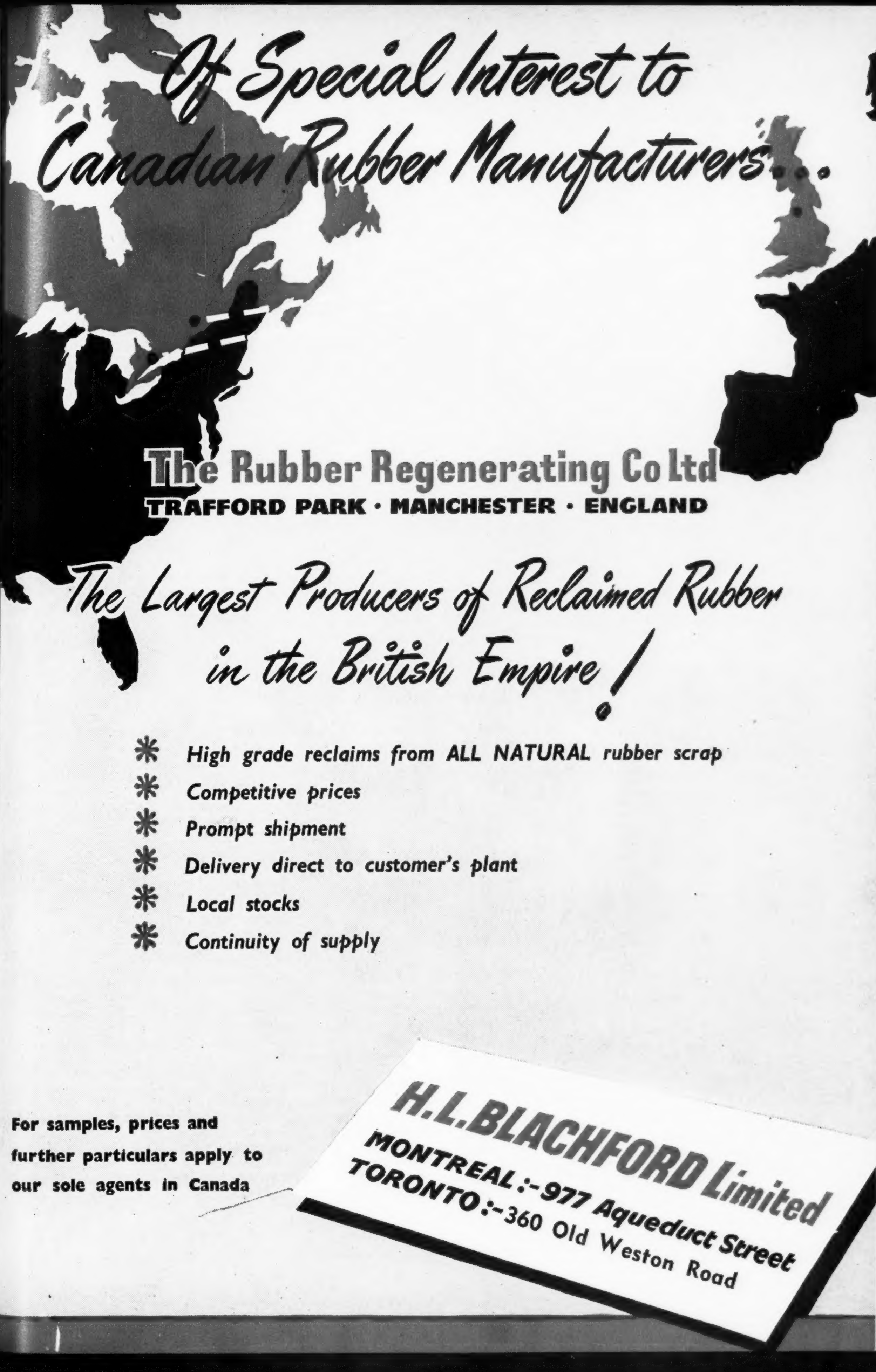
The tread bars are alternately wide and narrow for substantial noise reduction. Also, the multiplicity of angles and corners greatly increases traction and provides extra resistance to dangerous side slippage, according to General.

The tire design is said to obtain optimum benefit from the Nygen carcass. Such a deep tread could be used effectively only in combination with the specially processed cord which resists heat damage, bruise breaks, and blowouts, it was stated.

Nylon Truck Tires

A new line of low-price nylon tires for panel, pickup, delivery, and large over-the-highway trucks recently was introduced by United States Rubber Co., New York, N. Y. The company said extra-heavy rubber compounds are used to insulate the nylon cord in the new U.S. Royal Delivery truck tires.

Sizes with eight-ply rating and up are made with nylon cord with a tensile strength of 53 pounds, it was reported. Standard nylon tire cord has tensile strength of 27 pounds. The new tires range in size from 6:00-16 to 10:00-22 in tube construction. Tubeless sizes are 6:70-15 and 6:50-16.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New Products

Goodyear Double Eagle with optional Captive-Air Shield

New Double Eagle Tire

A new Double Eagle premium tire, described as the best and most trouble-free tire yet built, has been placed on the market by The Goodyear Tire & Rubber Co., Akron, O. Available in a full range of sizes, the tubeless tire is equipped with sidewall valve to permit the optional installation of the company's new Captive-Air Steel-Cord Safety Shield.

The tire features a carcass of 3-T nylon construction which the company considers 50% stronger than standard four-ply nylon tires. The tire is prefitted to the road by a process of preshaping the tire to its inflated contour, relieving cord, body, and tread tensions, it was reported.

The tread, compounded to withstand extreme heat and flex fatigue, is wider and deeper and features new Z-pattern traction edges for maximum traction on all roads. During the past two years the tire was tested extensively over hot Texas roads by customer trial throughout the nation (total log: 8,200,000 tire miles.)

The tire's distinctive sidewall design has a functional advantage of providing cooling in the heavy tread shoulder. A double scuff rib protects the tire's Captive-Air sidewall valve and a narrower white sidewall strip. The new Double Eagle is available in a full range of 14- and 15-inch sizes. Captive-Air shields, covering the same ranges, are available as optional equipment.

Both tire and shield are warehoused nationwide.

New Nycord Belting

A new line of Nycord rubber conveyor belts, made with cord plies and designed for general industrial use, also is being marketed by B. F. Goodrich Industrial Products. Until this development, cord construction was available only in belts especially designed for unusual heavy-duty, high tension installation, said the company.

Nycord belts are said to be more flexible and to have better troughing characteristics than belts made with conventional fabrics. The new construction greatly increases edge protection, fastener holding ability, and impact resistance and provides extra protection against damaging effects of acid, moisture, and mildew, it is further claimed. Each cord is completely insulated and embedded in rubber, it was reported. Water or acid entering through a cover cut cannot wick throughout the carcass, as in fabric belts, to cause early failure.

Available in three construction—Nycord 32, 36, and 42—the manufacturer recommends its new belt for normal conveyor systems in sand and gravel operations, quarry, power plant, mine, steel industry and general manufacturing plants.

TECHNICAL BOOKS

BOOK REVIEWS

"Emulsions—Theory and Practice." ACS Monograph No. 135. By Paul Becher. Cloth covers, 6-5/16 by 9¼ inches, 382 pages. Reinhold Publishing Corp., New York, N. Y. Price, $12.50.

"This book is an essentially self-contained discussion of modern emulsion theory and practice, with particular attention to the developments of the last 15 to 17 years."

This statement made by the author in the preface is a good characterization of the book. It is really amazing how much material can be compiled in a book of 382 pages (half of these are devoted to "theory").

The theoretical part begins with a clear discussion of the fundamentals of surface chemistry, which is important for the understanding of emulsion properties. The specialist in this field, however, will find much new work discussed also as, for example, the most important investigations of Van den Tempel on the kinetics of flocculation.

This reviewer, however, missed a discussion on the thickening action of water soluble polymers. This action is cited briefly as due to the external phase viscosity increase, which is certainly not the main mechanism, as the thickening must be primarily attributed to the interlinking of the emulsion particles in the same way as clusters are formed in the creaming operation.

The stability of emulsions being a matter of "to be or not to be" is discussed extensively and clearly; however, we feel that a short comparison with suspensoids and foams should have been made.

The chapter on the chemistry of emulsifying agents deals with the various types and with the emulsifier efficiency in relation to the composition.

The next chapter discusses the techniques of emulsification, the several types of colloid mills used, as well as ultrasonic emulsors.

Then a short survey is given of the various applications, and we also learn how to destroy emulsions when they are undesirable as in the petroleum field.

The last chapter discusses the testing of emulsion properties (surface tension, viscosity, emulsion type, size distribution, stability, and electrophoresis).

A list of commercially available emulsifying agents concludes this most valuable book.

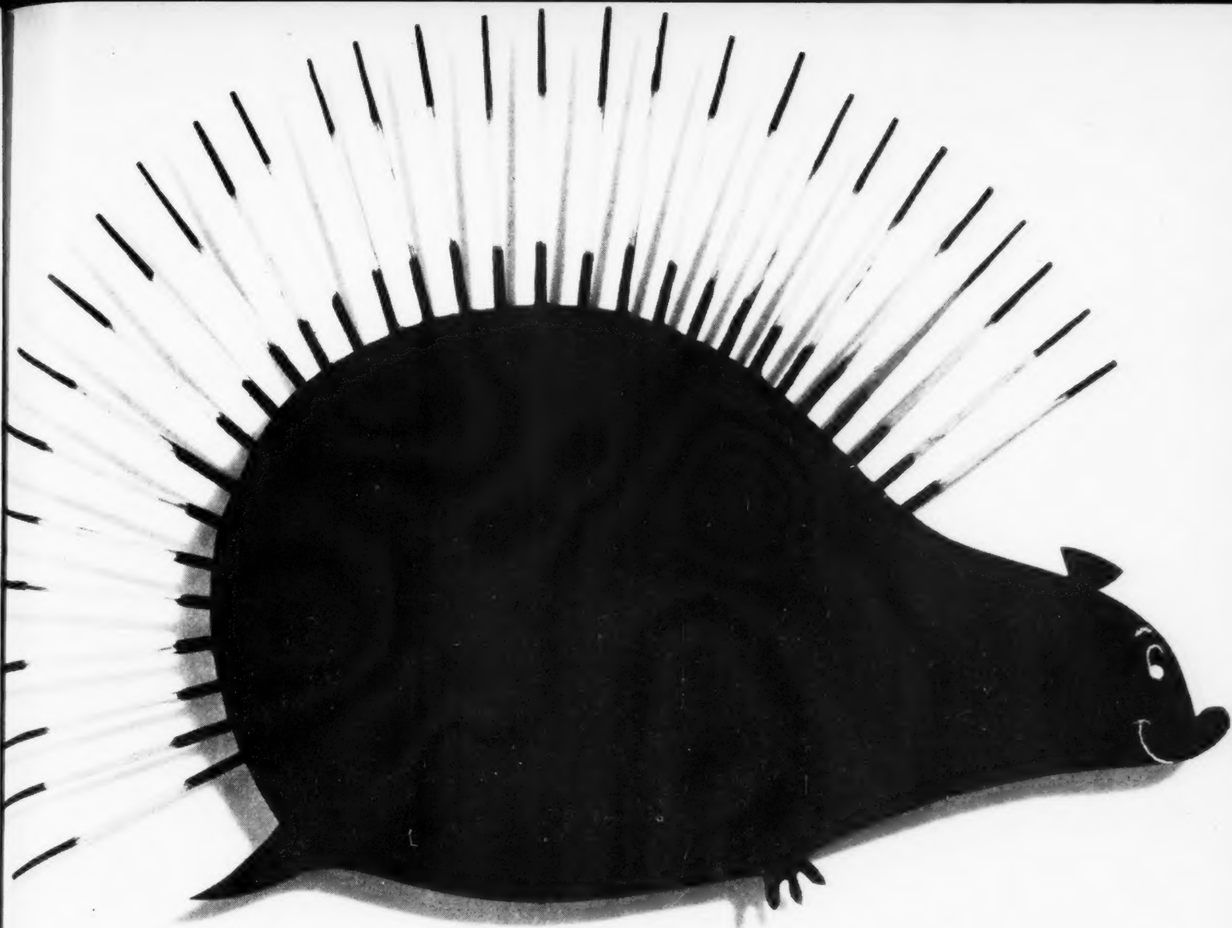
G. E. VAN GILS

"Annual Report on the Progress of Rubber Technology." Vol. XXI, 1957. Edited by T. J. Drakeley. Published by W. Heffer & Sons, Ltd., Cambridge, England. Cloth cover 7¼ by 9¾ inches, 134 pages, Price, £1-5s.

With this twenty-first volume the "Annual Report on the Progress of Rubber Technology," as prepared by the annual report subcommittee of the Institution of the Rubber Industry headed by T. H. Messenger and edited by Dr. Drakeley, this publication has attained its majority, Mr. Messenger states in the Foreword. He pays tribute to the Research of the British Rubber Manufacturers for its help and the use of *Rubber Abstracts*, to C. F. Flint, the former chairman of the annual report subcommittee, and to Dr. Drakeley.

The annual report is not a complete bibliography, but is prepared to show a pattern of progress in rubber technology by the use of selected items from the literature and is therefore sometimes critical. For 1957, the annual report at 134 pages is less than for 1956 when 161 pages were required.

There are 23 subjects covered in the annual report, mostly



Technical Books

rubber products, with sections however, devoted to planting and production of natural rubber, chemistry, physics, synthetic rubber, works processes and materials, and machinery and appliances. In the chapter on synthetic rubber a convenient tabulation of the location and estimated production capacity of the Free World's synthetic rubber plants is given. The chapter on fibers and fabrics makes note of the Soviet Union's considerable advances in the textile and textile-rubber (Enant—a polyamide fiber; Nitron—an acrylic type) fields.

Considerable attention is devoted to nuclear energy and its use for cross-linking rubber in the chapter on chemistry and again in the chapter on physics. Although England may have more gamma radiation available within the next ten years, research on the effects of radiation on rubbers is more active in America than in England, it was said.

NEW PUBLICATIONS

"Double-Planetary Change Can Mixers." Charles Ross & Son Co., Inc., Brooklyn, N. Y. 4 pages. This brochure, No. 5A, illustrates and describes the improved double-planetary changeable can mixers offered for mixing all types of light or heavy paste materials. This bulletin shows 14 different-size mixers available from the small one-gallon laboratory size to the 150-gallon large production size and describes the intense compressive and shearing action developed by the double-planetary stirrer which effectively breaks down and disperses lumps or agglomerates. The features available, such as variable-speed drives, hydraulic raising and lowering, vacuum tight covers, and jacketed cans for heat control, are fully outlined; while a complete specification chart gives further details of each size of mixer.

"Adipic Acid." Technical Bulletin I-12R. National Aniline Division, Allied Chemical Corp., New York, N. Y. 36 pages. This revised edition contains basic data for the researcher—including physical properties, six pages of chemical properties and reactions, 19 pages of suggested uses, and a list of 271 literature references on this reactive dicarboxylic acid. A diagram of basic reactions of adipic acid is given.

"What Is the Rubber Industry?" The Rubber Manufacturers Association, Inc., New York, N. Y. 16 pages. This booklet describes the present situation of the $6.4 billion American rubber industry, including its contributions to national security and facts and figures on the breadth and depth of the industry. Topics about the industry cover the amounts spent for materials and services, salaries and wages, depreciation, earnings after taxes, taxes, and borrowing through 1957. A note on the future is provided as well as an appendix containing the latest statistics of the industry.

"Model FF Automatic Blending Scale." Data Sheet 5802. Richardson Scale Co., Clifton, N. J. 2 pages. A fully automatic Model FF blending scale for proportioning various grades of free-running materials is described and illustrated in this data sheet. It explains how the scale automatically receives, weighs, discharges, and records granular materials up to ¼-inch in size. A detailed line drawing gives full dimensions. Specifications are also included.

"B. F. Goodrich Protective Clothing." B. F. Goodrich Industrial Products Co., Akron, O. 8 pages. This catalog, covering the company's industrial protective clothing, illustrates and describes work suits, raincoats, storm suits, gloves, and aprons used in industry and protective coats for police and firemen. Accessories include Koroseal film sleeve protectors, rubber-coated leggings and hats. Charts make it easy to select garments according to weight, service, color, and material—rubber, Koroseal, neoprene, Hycar. A special section, devoted to glove selection, features a chart that compares characteristics of rubber, neoprene, and Koroseal gloves in typical industrial service.

Publications of Thiokol Chemical Corp., Trenton, N. J.:

"Rigithane 112-Urethane Foam." 12 pages. This bulletin gives product specifications and application data on Thiokol's urethane foam, Rigithane 112. The foamed-in-place characteristics of these products produce lightweight panels with high structural strength for use as insulation, sound absorbers, and vibration dampers.

"The Effect of Moisture Content of Metallic Chloride Catalysts on the Dimethylol Phenol Cure." Bulletin 100-4C. 12 pages. This study describes the effect of moisture content on the efficiency of metallic chloride catalysts in the dimethylol phenol resin cure for butyl rubber. The data indicate the results obtained using both ferric and stannous chloride catalysts with varying amounts of moisture, including the commercial hydrated forms. Tables and curves are included which show the effect of both cure temperature and moisture content on the cure activity, physical properties, compression set, and heat resistance of the butyl rubber compounds.

Publications of National Polychemicals, Inc., Wilmington, Mass.:

"Kempore R-125 Blowing Agent for Rubber and Plastic." PKB-1. 4 pages. This technical bulletin gives products description, compounding characteristics, and suggested compounding formulae for Kempore R-125, a new nitrogen-releasing blowing agent for expanded cellular rubber and thermoplastic resins. It is said to produce odorless, non-staining, non-discoloring, low-density sponge of extremely fine, uniform cell structure. The new material does not support combustion, and it can be processed safely in the Banbury mixer.

"Kempore R-125 Blowing Agent for PVC." PKB-2. 7 pages. This bulletin describes the new material, same as above, and gives formulae for expanded calendered sheeting, high- and low-density sponge, plastisol sponge, both free and pressure blown types. A list of suppliers of various compounding ingredients listed is provided.

"Backsizing Carpets with Chemigum Latex." Tech-Book Facts Bulletin No. 58-135. The Goodyear Tire & Rubber Co., Chemical Division, Akron, O. 2 pages. Chemigum Latex 248, researched and developed specifically for textile applications, is a high-solids (55%), medium nitrile latex with unusual aging properties. This bulletin gives a formulation which includes a Pliovic Latex backing compound and lists advantages such as long term aging, color control, flexibility control, simple compounding, low odor anl low cost. Processing and equipment suggestions are included.

"Enjay Butyl. Volume II." Enjay Company, Inc., New York, N. Y. 60 pages. This volume contains the first section on general compounding which presents, under one cover, a selective yet comprehensive study of accelerators, carbon blacks, mineral fillers, and process oils in Enjay butyl rubber. The second section of this volume, not yet available, will classify by hardness many of the compounds contained in the first section. The loose-leaf type volume should assist the compounder in designing butyl compounds and lead to new and profitable products made from the rubber.

"Elastomers Notebook." No. 82. E. I. du Pont de Nemours & Co., Inc., elastomer chemicals department, Wilmington, Del. 12 pages. This bulletin contains facts for engineers about the company's synthetic rubbers. Various applications described are a Hypalon coated concrete cathedral, neoprene jacketed cable for an expressway's lighting, a neoprene impregnated seagoing raft, a neoprene jacketed fuel oil hose, structural uses of rigid urethane foam in an equipment hut, neoprene lubricators and urethane foam seals for freight car wheel bearings, and other applications.

"Chemicals for the Creative Chemist." Naugatuck Chemical Division, United States Rubber Co., Naugatuck, Conn. 18 pages. This booklet describes 18 intermediate chemicals, some commercial and others experimental, which are regarded as having research possibilities. It also gives physical and chemical properties and lists suggested applications for each chemical.

Technical Books

"Velsicol W-617 Emulsion in Protective and Decorative Coatings." Velsicol Chemical Corp., Chicago, Ill. No. 228. 25 pages. This technical bulletin gives comprehensive data on formulations and properties of Velsicol W-617 in emulsion paints. Velsicol W-617 is an anionic emulsion of a hydrocarbon copolymer resin prepared from monomers selected to provide the optimum in pigment binding properties in its own right, yet maintaining compatibility properties with currently available latex materials used in emulsion paint formulations. This film-forming emulsion is the result of an effort to produce a resin emulsion that would have optimum formulation versatility.

"Durez Polyester Colors." Durez Plastics Division, Hooker Chemical Corp., North Tonawanda, N. Y. 8 pages. Colored photographs illustrate several of the products in which this material is already being used economically such as frying pan handles, knobs and feet, sewing machine parts including the motor housing, circuit breakers, and other electrical components. Some expected future applications are also depicted. Discussed in this bulletin are suggested molding equipment, compression molding pressures, closed-mold technique pressures, preforming, and preheating. Also treated are mold temperature, curing time, finishing and machining, drilling and tapping, and shelf life. Data sheets are available which supply current information on the physical properties of these polyester compounds.

"Hycar Latex Newsletter." B. F. Goodrich Chemical Co., Cleveland, O. No. 17. 20 pages. This newsletter, devoted to the use of Hycar latices as greaseproof coatings on papers and as saturants for paper, contains four recipes and procedures for obtaining greaseproofness. Various latices are compared and the outstanding properties of each as a saturant have been singled out. Blending of Hycar latices and melamine-formaldehyde resins has provided interesting properties, such as unusually high wet strengths. Also shown are the range of properties that can be obtained by blending Hycar latices with high-styrene latices and with colloidal silica.

"Low-Temperature Non-Volatile Plasticizers for Hycar 4021." Hycar Technical Newsletter, Vol. VII, No. 2. 16 pages. Some surfactants—Triton X-100, Igepal CO-730, and Igepal CO-630—have been evaluated and appear to be the most satisfactory softeners for Hycar 4021, a special polyacrylic rubber. Other topics covered in this Newsletter include plasticizers for Hycar 4021, a compound made from 4021 to meet ASTM TB-408 $E_1E_3E_4$, low water-swell Hycar compounds, automotive fuel line specification, O-ring compound, and low conversion Hycar 1052.

"Solenoid Valve Factory Stock List." No. 505. Automatic Switch Co., Florham Park, N. J. 8 pages. This new stock list contains prices, valve ratings, flow diagrams, illustrations and engineering data. Sufficient ordering information is included. Two-, three-, and four-way solenoid valves, in all sizes, are listed.

"Consulting Chemical Market Research." Roger Williams Technical & Economic Services, Inc., Princeton, N. J. 16 pages. This photographically illustrated brochure describes this consulting chemical market research company's operations and facilities. It also gives the company's history and lists various projects which it has undertaken.

"Jal-Jacket." Jones & Laughlin Steel Corp., Pittsburgh, Pa. 4 pages. This pamphlet contains information about a newly developed rigid plastic pipe encased in a steel jacket. The new product, known as Jal-Jacket, combines the pressure-retaining strength of steel pipe with the chemical resisting properties of unplasticized PVC pipe. Specifications, line drawings, and other pertinent information are included in the pamphlet.

"Preventive Maintenance Chart." Lewis-Shepard Products, Inc., Watertown, Mass. A new electric fork truck preventative maintenance chart, this chart pinpoints 28 specific areas that should be inspected daily, weekly, or monthly. It has appropriate blocks provided for initialing as the points are inspected.

Publications of Dow Corning Corp., Midland, Mich.:

"Silastic Notebook Contents." This contents sheet, dated April 15, 1958, replaces the one dated March 1, 1958. It lists the names of the company's data sheets, their date, and the tab markings.

"Silastic 50—General-Purpose Stock." 2 pages. Silastic 50 is a tough, high tensile strength, high elongation silicone rubber serviceable from —70 to 500° F. This data sheet provides the latest information on its specifications, applications, typical properties, effect of cure, and vulcanization data.

"Silastic S-6538." 2 pages. Silastic S-6538 is designed primarily for use in making self-adhering unsupported tapes. Wrapped on itself, such tape bonds into a continuous rubbery mass having excellent dielectric properties. It is serviceable from —130 to 500° F. The data sheet describes Silastic S-6538, giving information on its applications, fabrication of tape, solvent dispersions data, and typical physical and electrical properties.

"Silastic S-2201—Wire Insulation Stock." 1 page. This silicone rubber was developed especially for use as insulation for wire and cable. The data sheet contains information on its characteristics, its vulcanization, and typical physical and electrical properties.

"Silastic S-9711." 1 page. This clear silicone rubber is said to be particularly inert to body fluids and tissues, and it can be heat sterilized without damage, thus enabling it to be used in various types of surgery applications. The data sheet lists such applications as well as information on its specifications, typical properties, and effect of oven cure time.

"Essential Features of Ovens for Curing Silastic." 2 pages. This data sheet lists the requirements which ovens must meet for curing Silastic silicone rubbers. These include: maintaining a temperature of 480° F., within a few degrees; adequate internal circulation of air; and an exhaust system vented to the outside to get rid of volatile materials. Detailed information is given as well as a graph covering the rate of air circulation in such ovens.

"Standards for Physical Security of Industrial and Governmental Facilities." Office of Defense Mobilization, Washington, D. C. 44 pages. This manual provides guidelines for protective measures which can be taken by defense plants and government facilities against espionage, sabotage, and other subversive activities. Security measures outlined include methods for prevention of unauthorized entry; control of the authorized entry of employes and visitors; fire prevention and control; and the prevention of accidents and of air, food, and water contamination. The manual may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., at a price of 30¢.

"Injection Molding and Extrusion of Moplen." Chemore Corp., New York, N. Y. 8 pages. No. 1. This bulletin presents technical information on recently introduced Moplen, a polypropylene made by Montecatini Co., Milan, Italy, which is represented by Chemore in the United States and Canada. Areas of moldability of this new isotatic polymer, Moplen, high-impact polystyrene, and low density polyethylene are graphically compared. A table, reviewing suggested remedies for some of the difficulties that may be encountered when molding or extruding Moplen, is included.

"Hoppenstedt Business References." Nordeman Publishing Co., Inc., New York, N. Y. This complete and up-to-date set of German industrial manuals and trade directories is now available in this country to meet the growing demand for information on German business. The manuals, printed in the German language, cover such fields as German corporations, large German enterprises, stock exchanges, machinery manufacturers, breweries, prominent business personalities, trade associations, etc. They are designed to provide valuable information for the American businessman dealing with Germany.

"Our Lips Are Sealed." Evans Research & Development Corp., New York, N. Y. 4 pages. This folder on applications research done by this firm deals mostly with plastics and related fields, although the laboratory is well known for its diverse activities. Included is a brief résumé that describes ten types of work that Evans Research has done in plastics and related fields.

MARKET REVIEWS

Synthetic Rubber

Consumption of new rubber in the United States in June totaled 106,261 long tons, against 102,318 tons used in May, according to the regular monthly report of The Rubber Manufacturers Association, Inc. Of this, 68,900 tons were synthetic rubber, compared with the May consumption of 66,304 tons, and the synthetic rubber ratio to total new rubber reached a new peacetime high of 64.84%.

This synthetic rubber consumption figure for June represents the best month this year since January. Consumption by types in tons, compared with May use, was as follows: SBR, 58,038, against 55,463; neoprene, 4,550 against 4,805; butyl 4,326 against 4,258; and nitrile 1,986 against 1,778.

Exports of synthetic rubber were down to 15,460 tons in June, compared with 18,968 tons in May; the drop in SBR exports amounted to about 2,300 tons, or about 17%; while the exports for the smaller volume synthetic rubbers were down 20-30%. Although the Middle East crisis has not as yet interfered with the flow of oil to Europe, any reduction in this flow would tend to increase the demand for synthetic rubber from the U. S. A.

Production of SBR and the specialty synthetic rubbers was maintained at about the same level as May, except for butyl rubber where, for purposes of inventory adjustment, production in June was only 1,926 tons, compared with 4,462 in May.

Although the rate of consumption of synthetic rubber for the first six months of 1958 would mean an annual consumption of only 810,000 tons, some 25,000 tons less than the recent International Rubber Study Group estimate, the industry is anticipating a significantly higher consumption rate for the second half of this year.

Natural Rubber

The natural rubber market seemed at last to have shaken off its sluggishness and during the last week of June developed a very steady tone, and in the aggregate the price level was raised for most grades. The New York natural rubber market has seen more activity than in the previous period (May 16-June 15), and even if manufacturers have made good use of their own buying organizations in the Far East, a fair amount of orders has been placed through the market. A quite substantial business in middle grade RSS, principally RSS #3, for export from New York has been reported, which has helped ease the pressure of these grades on the market and has in fact tended to narrow the differential slightly.

On the whole the offtake through all markets was at the time steady and orderly without disturbing the equilibrium, indicating that sufficient rubber of all grades is available to meet immediate needs.

June sales, on the New York Commodity Exchange, amounted to 6,120 tons, compared with 9,620 tons for May contract. There were 21 trading days in June and 21 during the June 16-July 15 period.

REX CONTRACT

1958	June 20	June 27	July 3	July 11
July	26.15	26.50	26.35	26.70
Sept.	26.06	26.70	26.61	26.85
Nov.	26.05	26.65	26.60	26.85
1959				
Jan.	26.05	26.70	26.55	26.85
Mar.	25.95	26.60	26.50	26.75
May	25.90	26.45	26.45	26.70
July	25.90	26.35	26.40	26.65
Total weekly sales, tons	1,300	2,700	550	1,200

On the physical market, RSS #1, according to the Rubber Trade Association of New York, averaged 26.61¢ per pound for the June 16-July 15 period. Average June sellers' prices for representative grades were: RRS #3, 23.62¢; #3 Amber Blankets, 20.86¢; and Flat Bark, 18.51¢.

NEW YORK OUTSIDE MARKET

	June 20	June 27	July 3	July 11
RSS #1	26.13	26.88	26.75	27.00
2	25.38	26.00	26.00	26.50
3	24.00	24.75	24.75	25.00
Pale Crepe				
#1 Thick	28.75	29.13	29.00	29.38
Thin	28.75	28.75	28.63	29.00
#3 Amber Blankets	20.75	21.13	21.00	21.25
Thin Brown Crepe	20.00	20.38	20.25	20.75
Standard Bark Flat	18.50	18.75	18.63	18.63

Latex

During the June 16-July 15 period the market for latex was somewhat more active than for a long time, and some substantial orders were placed for nearby shipment, which seems to have removed the danger of any immediate pressure occasioned by surplus latex.

Hevea latex, having recently undergone low consumption ratios, higher stocks, uncertain prices, cloudy future absorption, distressing competition from synthetics and plastics, appears to have regained its equilibrium and footing and looks forward to prospects of more orderly offtake, declining stocks, rational and competitive prices at a level to concern perhaps its plastic and synthetic alternates.

Production of *Hevea* latices in the various producing areas are now substantially at a minimum level, with forecasted imports into the United States well below forecasts of consumption, according to one source. Such a program, of course, is supported by the presence of large stocks and the need of reducing them.

Prices for ASTM Centrifuged Concentrated natural latex, in tank-car quantities, f.o.b., rail tank car, ran about 34.70¢ per pound solids. Synthetic latices prices were 21.5 to 38.2¢ for SBR; 37 to 53¢ for neoprene; and 46 to 60¢ per pound for the nitrile types.

Final April and preliminary May domestic statistics for all latices were reported recently by the United States Department of Commerce as given in the tabulation which is printed below:

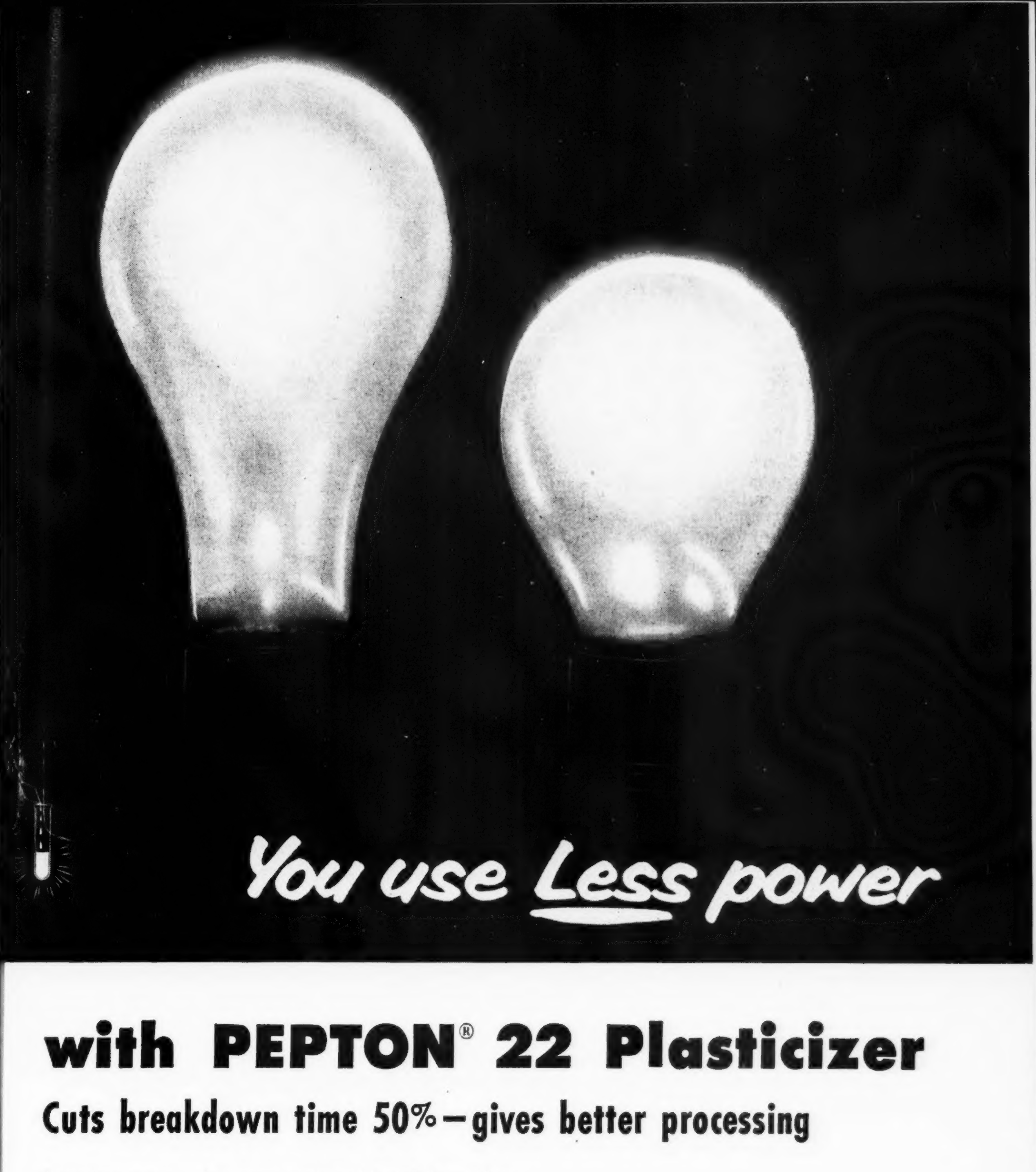
(All Figures in Long Tons, Dry Weight)

Type of Latex	Production	Imports	Consumption	Month-End Stocks
Natural				
Apr.	0	....	4,847	17,415
May	0	....	5,004	17,604
SBR				
Apr.	3,889	—	4,093	7,756
May	3,635	—	4,102	7,240
Neoprene				
Apr.	907	0	707	1,398
May	808	0	785	1,292
Nitrile				
Apr.	830	0	797	1,744
May	882	0	795	1,732

Reclaimed Rubber

There was a small increase in the reclaim usage from June 16 to July 15; however, according to one source, it was believed that the month of July would experience a decrease due to the fact that so many of the plants were taking their vacations during this period.

According to The Rubber Manufacturers Association, Inc. report, June production of reclaimed rubber reached 18,780 tons; while consumption was 21,125 long tons.


You use Less power

Market Reviews

Reclaimed Rubber Prices

Whole tire, first line	$0.11
Third line	.1025
Inner tube, black	.16
Red	.21
Butyl	.14
Light carcass	.22
Mechanical, light-colored, medium gravity	.155
Black, medium gravity	.085

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity, at special prices.

Scrap Rubber

During the June 16-July 15 period there was little activity in the scrap rubber market. Some quarters were hopeful that an upswing might develop after July 14, when many reclaimers and consumers who had been shut down for vacations were scheduled to resume operations. While some scrap items displayed a softer tone, prices were unchanged from previously quoted levels.

	Eastern Points	Akron, O.
	Per Net Ton	
Mixed auto tires	$11.00	$12.00
S. A. G. truck tires	nom.	15.50
Peeling, No. 1	nom.	23.00
2	nom.	20.00
3	nom.	15.50
Tire buffings	nom.	nom.
	(¢ per Lb.)	
Auto tubes, mixed	2.50	2.75
Black	6.25	6.25
Red	6.25	6.25
Butyl	3.50	3.625

Rayon and Nylon

The poor demand for rayon tire yarn and staple fiber was held to be responsible for one large producer's losses suffered in the first half of 1958. This firm, however, was optimistic about the second six months of the year, asserting that demand for textile and industrial yarns had improved.

The company reported that orders for the newer-type super-viscose cord had picked up substantially of late, and that production is well sold ahead. Several leading producers of tire cord yarn have concurrently sought to develop a high-strength rayon yarn that would be able to offer stiff competition to nylon.

Total packaged production of rayon and acetate filament yarn during June was 46,600,000 pounds, consisting of 16,600,000 pounds of high-tenacity rayon yarn and 30,000,000 pounds of regular-tenacity rayon yarn. For May, production had been: total, 49,200,000 pounds, including regular-tenacity rayon yarn, 30,600,000; high-tenacity rayon yarn, 18,600,000 pounds.

Filament yarn shipments to domestic consumers for June totaled 48,700,000 pounds, of which 16,800,000 pounds were high-tenacity rayon yarn and 31,900,000 were regular-tenacity rayon yarn. May shipments had been: total, 48,500,000 pounds; high-tenacity, 17,100,000 pounds; regular-tenacity, 31,400,000 pounds.

Stocks on June 30 totaled 66,700,000 pounds, made up of 19,600,000 pounds of high-tenacity rayon yarn and 47,100,000 pounds of regular-tenacity rayon yarn. End-of-May stocks had been: total, 69,600,000 pounds; high-tenacity rayon yarn, 20,000,000 pounds; regular-tenacity yarn, 49,600,000 pounds.

Nylon use in the tire cord market will be greater in 1958 than in 1957, according to a leading nylon tire cord manufacturer. Nylon's share of the cord market in 1957 was about 33%, or about 87 million pounds. In 1958, 12 of the 18 automobile manufacturers approved nylon cord tires to be used as optional equipment for their this year's models.

Rayon Prices

Tire Fabrics	
1100/490/2	$0.69 /$0.73
1650/908/2	.63 / .725
2200/980/2	.625/ .655
Tire Yarns	
High-Tenacity	
1100/ 490, 980	.50/ .64
1100/ 490	.59/ .63
1150/ 490, 980	.59/ .63
1165/ 480	.59/ .65
1230/ 490	.59/ .63
1650/ 720	.55/ .58
1650/ 980	.55/ .58
1875/ 980	.55/ .58
2200/ 960	.54/ .57
2200/ 980	.54/ .57
2200/1466	.64
4400/2934	.60
Super-High Tenacity	
1650/ 720	.58
1900/ 720	.58

Nylon Prices

Tire Yarns	
840/ 140	$1.10/$1.20
1680/ 280	1.20

Industrial Fabrics

Prices of some wide fabrics which are used for vinyl plastic coatings were tending to firm lightly during the period under review as a little brisker demand for these goods developed, and mill stocks generally were reported considerably reduced. Other wide coating fabrics, such as sateens and broken twills, were not advanced although buying of the broken twills for late July and early August delivery was reported to have been fairly brisk recently, and mill stocks on this number were not excessive, it was further reported.

An intended rise in prices will be broadened to include a number of different-type constructions. Though quotable prices on most cloths are unchanged, whatever constructive feature prevails consists of low inside levels rising and more independence given standard quality cloths and less to poorer grades. Usually quality conscious buyers who tested cheaper coating yardage because of tempting prices are back to top qualities, according to one source.

As the new automobile season begins to consider coated yardage needs, a stimulating influence has been prompted among weavers. Wariness is afoot, however, because the last thing grey cotton goods sources wish is to take too much for granted.

During this period a noticeable interest in 2.00 yard enameling duck was observed, derived from the coat and apron trade. Lots of wide sheetings were bought, also small fill-in yardages of sateens, osnaburgs, broken twills, ounce ducks, and various kinds of headlinings. It was small-volume business. Prices paid were often at the levels quoted below. Exceptions were repeated of sales at concessions, less than before; some involved other than top-grade yardages.

Industrial Fabrics

Broken Twills*		
54-inch, 1.14, 76x52 ... yd.	$0.52	
58-inch, 1.06, 76x52	.56	
60-inch, 1.02, 76x52	.5825	
Drills*		
59-inch, 1.85, 68x40 ... yd.	.33	
2.25, 68x40	.28	
Osnaburgs*		
40-inch, 2.11, 35x25 ... yd.	.2275	
3.65, 35x25	.1525	
59-inch, 2.35, 32x26	.255	
62-inch, 2.23, 32x26	.275	
Ducks		
Enameling Ducks*	S. F.	D. F.
38-inch, 1.78 yd.	$0.3263	.3313
2.00 yd.	.275	.28
51.5-inch, 1.35 yd.	.4375	.445
57-inch, 1.22 yd.	.4838	.50
61.5-inch, 1.09 yd.	.5413	.5538
Army Duck†		
52-inch, 11.70 oz., 54x40 (8.10 oz./sq.yd.) ... yd.	.5925	
Numbered Duck†		
List less 40%		
Hose and Belting Duck*		
Basis ... lb.	.63	
Sheeting*		
40-inch, 3.15, 64x64 ... yd.	.2175	
3.60, 56x56	.185	
52-inch, 3.85, 48x48	.2275	
57-inch, 3.47, 48x48	.24	
60-inch, 2.10, 64x64	.36	
2.40, 56x56	.31	
Sateens*		
53-inch, 1.12, 96x60 ... yd.	.56	
1.32, 96x64	.51	
57-inch, 1.04, 96x60	.615	
58-inch, 1.02, 96x60	.62	
1.21, 96x64	.57	
Chafer Fabrics*		
14.40-oz./sq.yd. P.Y. ... yd.	.73	
11.65-oz./sq.yd. S.Y.	.61	
10.80-oz./sq.yd. S.Y.	.6575	
8.9-oz./sq.yd. S.Y.	.67	
40-inch, 2.56, 35x25	.25	
60-inch, 1.71, 35x25	.435	

*Net 10 days.
†2% 10 days.

News about People

(Continued from page 775)

G. M. Hebert has been named manager of a newly created export sales division of Enjay Co., Inc., New York, N. Y., petrochemicals marketing firm. The new division will consolidate the export, worldwide, of all Enjay's products including butyl rubber and other polymers, chemicals, and petroleum additives. Prior to his new appointment, Hebert served as Enjay's sales manager for Paramins, the company's petroleum additives.

Arnold L. Peterson has been assigned as a botanist to the Goodyear Sumatra Plantations Co. He has been associated with The Goodyear Tire & Rubber Co., Akron, O., since 1952, having joined the firm's subsidiary Aircraft corporation as a member of the production squadron. He was transferred to the manufacturing planning department in 1954 and two years later was appointed group leader in that same department.

Gerrit Oldenbrook, a veteran of the coating industry, has been named to head the vinyl coating operations of the new plastics division at Aldan Rubber Co., Philadelphia, Pa. He comes to Aldan from his position as general manager of the coating plant of H. M. Sawyer Co., Watertown, Mass. Aldan's new vinyl coating operations will provide the firm's customers an opportunity to specify coatings in either plastic or rubber coated fabrics.

Huey A. Seyfarth, who will be a senior at Mississippi State College during the 1958-59 school years, is the second recipient of the Harmon Connell Memorial Scholarship of the Southern Rubber Group. This scholarship was established in 1957 by SRG to honor the memory of Harmon Connell who was the first chairman of the Group.

Paul E. Dochety has joined American Enka Corp., New York, N. Y., as technical sales representative for the industrial sales department. Previously, he was technical representative for special products division, Lord Mfg. Co., and prior to that he was a development engineer in the textile and adhesive development department of The Firestone Tire & Rubber Co., Akron, O.

Lory A. Crisorio technical representative for Union Carbide Chemicals Co., division of Union Carbide Corp., has been transferred to the Chicago, Ill. district. Other technical representatives transferred were **D. Wallace Enright,** to the Charlotte, N. C., district; **H. Robert Hubbs,** to the Indianapolis Ind., district; and **Bernard W. Hurley,** to the Chicago, Ill., district.

STATISTICS

of the RUBBER INDUSTRY

U.S.A. Imports and Production of Natural (Including Latex and Guayule) and Synthetic Rubber (in Long Tons)

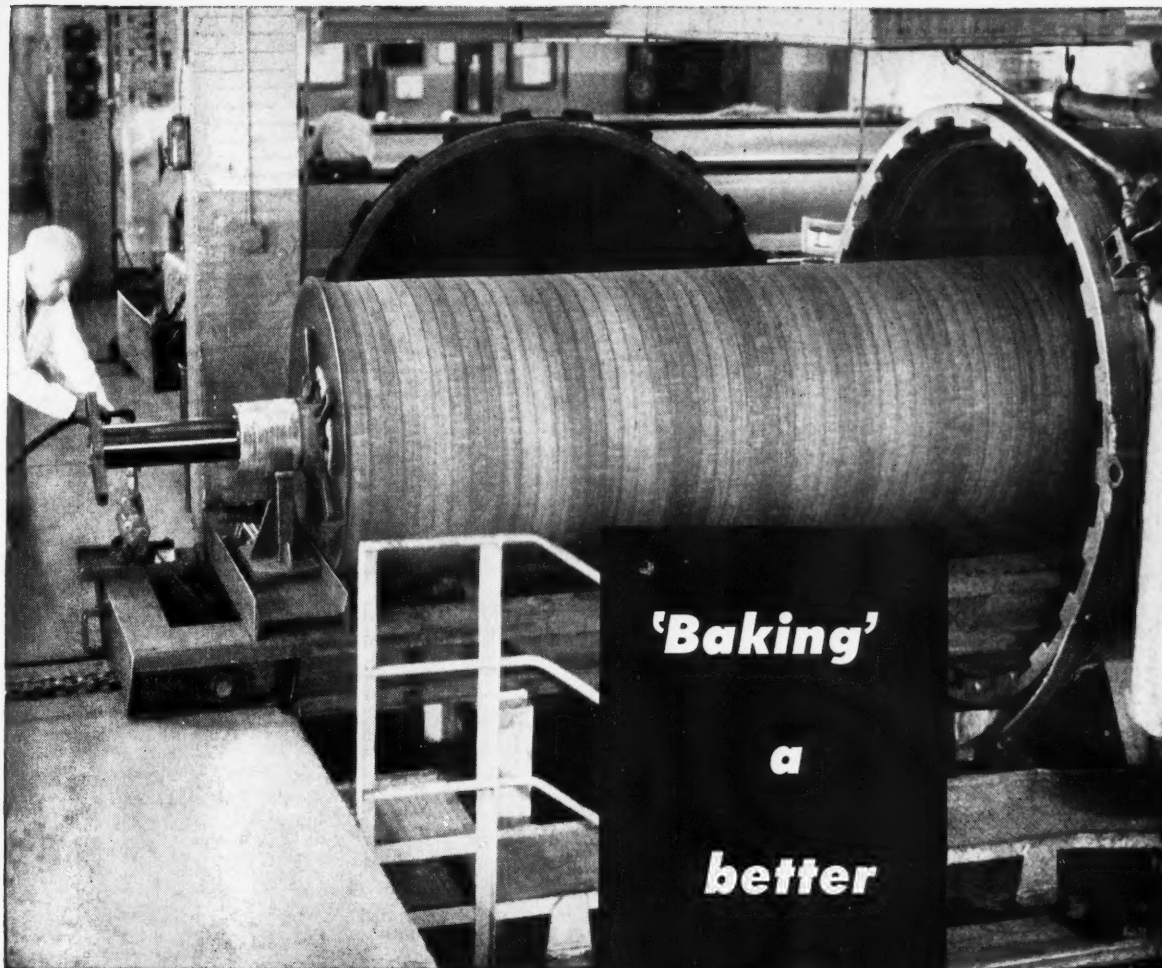
Year	Natural	GR-S	SBR Types	Butyl	Neoprene	N-Type	Total Natural and Synthetic
1955	637,577	236,556	564,589	56,179	91,357	32,623	1,616,478
1956	579,217	....	877,430	75,922	99,412	34,567	1,667,841
1957							
Jan.	46,349	....	76,224	6,366	9,432	2,893	141,264
Feb.	37,487	....	66,023	5,664	9,004	2,894	121,072
Mar.	40,680	....	76,546	6,460	8,031	3,291	135,008
Apr.	59,896	....	65,706	5,890	8,902	2,408	142,802
May	52,566	....	77,542	6,145	9,235	2,561	148,049
June	30,290	....	68,297	4,474	9,678	2,538	137,553
July	44,760	....	67,796	1,972	8,591	2,592	125,711
Aug.	48,951	....	76,197	5,455	9,033	2,737	142,373
Sept.	47,937	....	75,872	6,113	9,726	2,826	142,474
Oct.	49,371	....	87,709	6,085	9,545	3,062	155,772
Nov.	44,583	....	87,152	6,099	9,976	2,803	148,362
Dec.	53,922	....	85,223	6,469	9,568	2,519	157,701
Total	553,043	....	907,534	66,936	110,721	33,124	1,671,358
1958							
Jan.	45,564	....	85,379	6,149	8,804	2,384	148,280
Feb.	46,018	....	66,402	4,996	8,200	2,157	127,773
Mar.	39,885	....	69,230	4,698	7,671	2,042	123,526
Apr.	....	....	59,263	4,324	7,973	2,197	.....
May*	....	....	62,161	4,462	7,450	2,338	......

* Preliminary. Source: Bureau of the Census, Industry Division, Chemicals Branch, United States Department of Commerce.

U.S.A. Consumption of Natural (Including Latex) and Synthetic Rubber (Long Tons)

Year	Natural	GR-S	SBR Types	Butyl	Neoprene	N-Type	Total Natural and Synthetic
1955	634,800	234,963	507,034	53,991	72,876	26,035	1,529,699
1956							
Jan.	53,751	....	65,375	4,223	6,684	2,198	132,231
Feb.	50,285	....	62,366	4,155	6,430	2,289	125,525
Mar.	50,040	....	64,458	4,515	6,542	2,373	127,928
Apr.	47,446	....	62,179	4,228	6,125	2,150	122,128
May	48,342	....	63,629	4,285	6,379	2,103	124,738
June	43,638	....	56,390	4,026	5,536	1,864	111,454
July	38,353	....	48,907	3,316	4,435	1,538	96,549
Aug.	46,700	....	59,756	4,102	6,554	2,125	119,237
Sept.	44,179	....	57,135	4,044	6,057	1,969	113,384
Oct.	52,188	....	67,399	4,780	7,478	2,366	134,211
Nov.	42,946	....	58,692	4,093	6,676	2,065	114,472
Dec.	45,220	....	60,742	3,814	5,956	1,893	117,625
Yr.-end adj.	−1,000	...	−3,000	....	....	+1,000	−3,000
Total	562,088	....	724,028	49,581	74,852	25,933	1,436,482
1957							
Jan.	52,631	....	70,978	5,028	7,237	2,247	138,121
Feb.	46,427	....	64,322	4,581	6,235	2,122	123,687
Mar.	48,263	....	67,853	4,998	6,559	2,240	129,913
Apr.	45,368	....	63,280	4,651	6,295	2,129	121,723
May	46,385	....	66,774	4,902	6,441	2,125	126,753
June	41,282	....	58,479	4,198	5,816	1,963	111,738
July	39,683	....	58,021	4,146	5,231	1,646	108,833
Aug.	44,846	....	66,089	4,461	6,502	2,220	124,204
Sept.	43,527	....	64,505	4,654	6,351	2,141	121,326
Oct.	48,782	....	73,850	5,343	7,194	2,433	137,602
Nov.	43,816	....	62,635	4,521	6,136	2,110	119,218
Dec.	38,285	....	56,432	3,930	5,464	1,811	105,922
Total	538,761	....	767,218	55,813	75,661	25,187	1,462,640
1958							
Jan.	42,597	....	60,179	4,508	5,928	2,010	115,222
Feb.	36,711	....	52,962	4,255	5,045	1,968	100,941
Mar.	38,191	....	54,816	4,297	4,965	1,962	104,231
Apr.	36,608	....	55,133	4,621	4,962	1,897	103,221
May*	36,014	....	55,463	4,258	4,805	1,778	102,318

* Preliminary. Source: Bureau of the Census, Industry Division, Chemicals Branch, United States Department of Commerce.



U.S.A. Stocks of Latex

(Long Tons, Dry Weight)

Year	Natural	GR-S*	Neoprene	N-Type	Total Synthetic	Total Natural & Synthetic
1956	12,262	7,327	1,421	2,217	10,965	23,227
1957						
Jan.	11,831	7,191	1,329	1,936	10,456	22,287
Feb.	9,940	7,415	1,169	2,051	10,635	20,575
Mar.	10,173	7,689	1,170	2,157	11,016	21,189
Apr.	12,064	8,096	1,183	1,836	11,115	23,179
May	11,733	7,885	1,407	1,710	11,002	22,735
June	10,931	8,139	1,377	2,001	11,517	22,448
July	12,073	8,045	1,296	1,953	11,294	23,367
Aug.	13,535	7,997	1,309	1,545	10,851	24,386
Sept.	12,315	7,566	1,141	1,700	10,407	23,722
Oct.	12,399	7,254	1,142	1,723	10,119	22,518
Nov.	12,316	7,558	1,265	1,927	10,750	23,066
Dec.	14,454	8,347	1,367	2,374	12,088	26,542
1958						
Jan.	14,178	8,222	1,190	2,052	11,464	25,642
Feb.	15,506	7,992	1,251	2,297	11,540	27,046
Mar.	16,825	7,991	1,281	1,974	11,246	28,071
Apr.	17,415	7,756	1,398	1,744	10,898	28,313
May†	17,604	7,240	1,292	1,732	10,264	27,868

Source: Bureau of the Census, Industry Division, Chemicals Branch, United States Department of Commerce.
*Includes SBR Types.
† Preliminary.

U.S.A. Exports of Synthetic Rubber

(Long Tons)

Year	SBR Types	Butyl	Neoprene	N-Type	Total
1956	112,526	8,699	21,909	6,194	149,328
1957					
Jan.	13,989	207	2,500	540	17,236
Feb.	13,353	439	2,505	482	16,779
Mar.	13,664	1,014	2,466	781	17,925
Apr.	10,625	372	2,244	620	13,861
May	12,208	603	2,480	517	15,808
June	13,886	762	2,315	492	17,455
July	14,444	1,169	3,426	631	19,670
Aug.	13,795	758	2,786	478	17,817
Sept.	11,625	540	1,964	396	14,525
Oct.	12,200	1,261	2,588	467	16,516
Nov.	12,639	809	2,521	410	16,379
Dec.	15,549	814	2,447	563	19,373
Total	158,017	8,832	30,242	6,377	203,468
1958					
Jan.	14,109	1,626	2,649	513	18,897
Feb.	9,947	1,415	2,626	378	14,366
Mar.	15,647	757	3,424	410	20,238
Apr.	11,583	949	2,356	698	15,586

Source: Bureau of the Census, Industry Division, Chemicals Branch, United States Department of Commerce.

U.S.A. Consumption of Natural and Synthetic Latices

(Long Tons, Dry Weight)

Year	Natural	GR-S*	Neoprene	N-Type	Total Synthetic	Total Natural & Synthetic
1956	73,100	65,380	8,733	8,934	83,047	156,147
1957						
Jan.	6,994	6,288	856	841	7,985	14,979
Feb.	6,398	5,894	758	708	7,360	13,758
Mar.	7,081	6,370	784	799	7,953	15,034
Apr.	6,434	5,554	772	710	7,036	13,470
May	5,867	5,114	814	731	6,659	12,526
June	5,445	4,790	736	610	6,136	11,681
July	5,180	4,269	677	480	5,426	10,606
Aug.	6,499	5,758	784	823	7,365	13,864
Sept.	6,645	5,676	712	753	7,141	13,786
Oct.	7,250	6,556	788	857	8,201	15,451
Nov.	6,783	5,776	725	712	7,213	13,996
Dec.	5,933	5,260	633	606	6,499	12,432
Total	75,009	68,305	9,539	10,230	88,074	163,083
1958						
Jan.	6,380	5,438	806	683	6,927	13,307
Feb.	5,380	4,475	640	806	5,921	11,301
Mar.	5,560	4,708	633	720	6,061	11,621
Apr.	4,847	4,093	707	797	5,597	10,444
May†	5,004	4,102	785	795	5,682	10,686

Source: Bureau of the Census, Industry Division, Chemicals Branch, United States Department of Commerce.
*Includes SBR Types.
† Preliminary.

U.S.A. Imports and Production of Natural and Synthetic Latices

(Long Tons, Dry Weight)

Year	Natural	GR-S*	Neoprene	N-Type	Total Synthetic	Total Natural & Synthetic
1956	71,718	69,762	10,642	10,650	91,054	162,772
1957						
Jan.	6,460	7,228	905	960	9,093	15,553
Feb.	4,342	6,481	724	1,035	8,240	12,582
Mar.	5,856	7,227	924	1,127	9,278	15,134
Apr.	8,812	6,306	976	881	8,163	16,975
May	5,794	5,495	1,082	933	7,510	13,304
June	4,809	5,251	819	886	6,956	11,765
July	6,243	4,646	572	844	6,062	12,305
Aug.	6,834	6,816	874	608	8,298	15,132
Sept.	5,516	5,649	917	1,285	7,851	15,268
Oct.	8,351	6,876	885	1,133	8,894	14,811
Nov.	6,496	6,515	1,021	994	8,530	15,026
Dec.	7,572	5,915	704	734	7,353	14,925
Total	69,513	74,405	10,403	11,637	96,445	165,958
1958						
Jan.	6,289	5,998	788	785	7,571	13,860
Feb.	7,013	3,852	765	671	5,288	12,301
Mar.	7,147	4,880	759	787	6,426	13,573
Apr.	....	3,889	907	830	5,626	....
May†	....	3,635	808	882	5,325	....

Source: Bureau of the Census, Industry Division, Chemicals Branch, United States Department of Commerce.
*Includes SBR types.
†Preliminary.

U.S.A. Production of Cotton, Rayon, and Nylon Tire Fabrics

(Thousands of Pounds)

	Cotton and Nylon*		Rayon Tire Cord		
	Cotton Chafer Fabrics and Other Tire Fabrics	Cotton and Nylon Tire Cord and Fabrics	Woven	Not Woven	Total All Tire Cord and Fabrics
1957					
Jan.-Mar.	11,028	20,676	69,610	21,872	124,297
Apr.-June	10,456	24,852	63,195	16,037	115,418
July-Sept.	9,102	24,852	54,968	10,509	100,046
Oct.-Dec.	9,207	23,868	58,356	9,216	100,647
1958					
Jan.-Mar.	9,750	18,280	56,522	8,372	167,924

* Cotton and nylon figures combined to avoid disclosing data for individual companies.
Source: Bureau of the Census, United States Department of Commerce.

U.S.A. Stocks of Synthetic Rubber

(Long Tons)

Year	SBR Types	Butyl	Neoprene	N-Type	Total
1956	151,934	28,685	14,043	8,184	202,846
1957					
Jan.	143,177	29,810	13,073	7,664	193,724
Feb.	134,587	29,951	12,705	7,565	184,808
Mar.	131,255	30,814	11,949	7,795	181,813
Apr.	122,764	31,536	12,064	7,247	173,611
May	121,638	31,812	13,010	6,981	173,441
June	120,694	31,569	13,822	7,085	173,170
July	113,143	28,208	15,172	7,125	163,648
Aug.	111,962	28,339	14,603	6,784	161,688
Sept.	109,417	29,132	14,751	7,207	160,507
Oct.	113,382	29,008	15,181	7,134	164,705
Nov.	124,432	29,702	16,453	7,380	177,967
Dec.	140,199	31,489	18,943	7,954	198,585
1958					
Jan.	152,441	31,753	18,691	7,512	210,397
Feb.	151,501	31,369	18,408	7,635	208,914
Mar.	153,221	30,796	18,504	6,947	209,468
Apr.	143,981	30,012	18,764	6,469	199,226
May*	137,277	29,246	19,014	6,392	191,929

Source: Bureau of the Census, Industry Division, Chemicals Branch, United States Department of Commerce.
*Preliminary.

Carbon Black Statistics—Five Months, 1958

Furnace blacks are classified as follows: SRF, semi-reinforcing furnace black; HMF, high modulus furnace black; GPF, general-purpose furnace black; FEF, fast-extruding furnace black; HAF, high abrasion furnace black; SAF, super abrasion furnace black; ISAF, intermediate super abrasion furnace black.

(Thousands of Pounds)

	Jan.	Feb.	Mar.	Apr.	May
Production					
Furnace types					
Thermal	12,159	10,070	11,942	10,436	9,378
SRF	22,704	17,946	18,714	14,587	14,750
HMF	5,769	3,190	5,242	4,302	5,257
GPF	4,470	4,852	4,632	4,872	5,183
FEF	16,992	16,398	18,272	17,880	13,384
HAF	39,384	32,054	33,735	42,134	35,256
SAF	—	728	968	934	67
ISAF	13,888	14,739	16,522	12,782	11,011
Total furnace	115,330	99,977	110,027	107,927	94,286
Contact types	28,574	25,712	27,328	26,051	26,623
Totals	143,904	125,689	137,355	133,978	120,909
Shipments					
Furnace types					
Thermal	12,237	8,648	8,762	10,034	8,126
SRF	21,706	18,360	19,869	23,201	19,589
HMF	5,320	5,030	4,355	5,735	4,682
GPF	5,589	4,793	3,721	4,267	3,945
FEF	17,609	17,285	16,780	17,988	15,821
HAF	35,550	32,938	34,433	37,390	36,802
SAF	531	387	560	358	319
ISAF	14,359	12,590	14,332	14,310	13,254
Total furnace	112,901	100,031	102,812	113,283	102,547
Contact types	25,571	23,072	23,617	25,863	26,091
Totals	138,472	123,303	126,429	139,146	128,638
Producers' Stocks, End of Period					
Furnace types					
Thermal	20,086	21,508	24,688	25,090	26,342
SRF	75,022	74,608	73,453	64,906	60,123
HMF	10,674	8,834	9,721	8,288	8,863
GPF	8,409	8,468	9,379	9,917	11,090
FEF	32,930	32,043	33,535	33,427	30,990
HAF	57,104	56,220	55,522	60,266	58,720
SAF	7,388	7,729	8,137	8,713	8,457
ISAF	49,406	51,555	53,745	52,217	49,974
Total furnace	261,019	260,965	268,180	262,824	254,559
Contact types	83,776	86,216	89,927	89,885	90,417
Totals	344,795	347,181	358,107	352,709	344,976
Exports					
Furnace types					
Total furnace	23,723	22,719	25,720	24,534	....
Contact types	13,519	10,933	14,018	12,143	....
Totals	37,242	33,652	39,738	36,677	....

Source: Bureau of Mines, United States Department of the Interior, Washington, D. C.

U.S.A. Synthetic Rubber Industry, Wages, Hours

Year	Average Weekly Earnings	Average Weekly Hours	Average Hourly Earnings
1956	103.50	41.4	2.50
Oct.	107.52	42.0	2.56
Nov.	103.57	41.1	2.52
Dec.	107.33	41.6	2.58
1957			
Jan.	106.30	41.2	2.58
Feb.	104.19	40.7	2.56
Mar.	104.86	40.8	2.57
Apr.	103.94	40.6	2.56
May	105.93	40.9	2.59
June	103.88	39.8	2.61
July	108.75	41.2	2.64
Aug.	109.34	40.8	2.68
Sept.	108.40	40.6	2.67
Oct.	108.14	40.5	2.67
Nov.	112.73	41.3	2.73
Dec.	112.34	41.3	2.72
1958			
Jan.	109.62	40.6	2.70
Feb.	109.21	40.6	2.69
Mar.	110.16	40.8	2.70

Source: BLS, United States Department of Labor.

U.S.A. Rubber Industry Sales and Inventories

(Millions of Dollars)

	Value of Sales*				Manufacturers' Inventories*			
	1955	1956	1957	1958	1955	1956	1957	1958
Jan.	424	415	496	448	790	935	1,047	1,100
Feb.	440	445	495	413	782	970	1,036	1,087
Mar.	466	451	476	412	805	979	1,030	1,112
Apr.	445	445	490	438	784	970	1,031	1,078
May	465	464	481	...	810	985	1,024	....
June	465	450	458	...	850	975	1,027	....
July	471	459	514	...	853	987	1,045	....
Aug.	456	436	481	...	863	1,007	1,074	....
Sept.	456	429	481	...	874	1,007	1,074	....
Oct.	447	454	490	...	902	1,022	1,097	....
Nov.	482	463	431	...	935	1,024	1,101	....
Dec.	465	461	427	...	934	998	1,092	....
Total	5,493	5,372	5,720	...	Av. 845	988	12,678	....

Source: Office of Business Economics, United States Department of Commerce.
*Adjusted for seasonal variation.

U.S.A. Automotive Inner Tubes

(Thousands of Units)

Year	Shipments: Original Equipment	Re-placement	Export	Total	Production	Inventory End of Period
1956	3,101	32,358	1,041	36,499	34,407	6,109
1957						
Jan.	274	3,263	72	3,608	2,918	6,294
Feb.	267	2,964	61	3,292	3,362	5,960
Mar.	240	3,057	100	3,397	3,822	6,540
Apr.	311	2,708	85	3,104	3,428	6,969
May	301	2,827	86	3,214	3,548	7,422
June	275	3,141	69	3,485	3,025	6,946
July	258	3,364	86	3,708	2,941	6,287
Aug.	243	3,358	81	3,683	3,134	5,966
Sept.	213	3,180	90	3,483	3,365	6,174
Oct.	242	2,809	121	3,172	3,764	6,909
Nov.	259	2,468	65	2,792	2,585	6,250
Dec.	225	2,392	101	2,717	2,778	7,671
Total	3,045	35,684	1,077	39,806	39,763	
1958						
Jan.	232	4,005	71	4,309	3,344	6,699
Feb.	209	3,014	73	3,296	3,443	6,983
Mar.	209	3,481	74	3,764	3,685	7,066
Apr.	223	2,956	64	3,243	3,624	7,609
May	225	2,742	68	3,035	3,530	8,189

Source: The Rubber Manufacturers Association, Inc.

U.S.A. New Supply, Consumption, Exports, and Stock of Reclaimed Rubber

(Long Tons)

Year	New Supply	Consumption	Exports	Stocks
1955	326,649	312,781	13,988	31,498
1956	287,220	270,547	13,832	34,969
1957				
Jan.	25,103	24,053	1,288	34,552
Feb.	21,896	22,773	1,263	32,010
Mar.	25,088	24,633	1,298	30,975
Apr.	22,878	23,145	1,201	30,258
May	24,884	23,816	1,277	29,847
June	22,402	21,352	1,083	30,378
July	20,444	19,676	757	29,972
Aug.	20,423	22,429	917	28,521
Sept.	19,892	21,704	714	25,983
Oct.	26,419	24,925	1,230	27,171
Nov.	22,083	20,583	1,150	27,855
Dec.	20,101	18,263	843	29,323
Totals	273,989	266,852	13,021	29,323
1958				
Jan.	21,159	21,186	892	29,569
Feb.	18,319	18,130	665	28,838
Mar.	19,601	19,300	1,025	28,984
Apr.	19,818	19,746	832	29,440
May*	18,942	20,104	....	27,862

Source: Bureau of the Census, Industry Division, Chemicals Branch, United States Department of Commerce.
* Preliminary.

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GENERAL RATES	Light face type $1.25 per line (ten words) Bold face type $1.60 per line (eight words)
SITUATIONS WANTED RATES	Light face type 40c per line (ten words) Bold face type 55c per line (eight words)
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Development and technical service work. Experience in aqueous protective coatings including latex paints required. State qualifications. Metropolitan northern New Jersey area.

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HYDRAULIC PRESSES, 2500-TON DOWNSTROKE 54" x 102". 325-Ton upstroke 28" x 28". 300-Ton upstroke 40" x 30". 300-Ton upstroke 22" x 35". 250-Ton French Oil upstroke 38" x 28". 170-Ton upstroke 24" x 24". 150-Ton Elmes upstroke 36" x 25". 140-Ton 36" x 36" platens. 300-Ton Stokes Transfer Molding Press. New & Used Lab. 6" x 13", 6" x 16", and 8" x 16" Mills and Calenders, & sizes up to 84". Baker-Perkins & Day Heavy-Duty Jack. Mixers up to 200 gals. Hydraulic Pumps & Accumulators, Rotary Cutters. Colton 5½ T, 4T & 3DT Preform Machines motor driven. Other sizes in Single-Punch & Rotary Pre-Form Machines. Banbury Mixers, Crushers, Churns, Tubers, Vulcanizers, Bale Cutters, Gas Boilers, etc. SEND FOR SPECIAL BULLETIN. WE BUY YOUR SURPLUS MACHINERY STEIN EQUIPMENT COMPANY, 107-8TH STREET, BROOKLYN 15, NEW YORK. STERLING 8-1944.

FOR SALE: ALL IN STOCK: 10—Baker-Perkins #17 200-gal. sigma-blade mixers. 5—Pfaudler 500-gallon glass-lined Reactors, 6—465-gal. stainless Reactors, 150# W.P., 165# jkt. 3—4' x 84" vert. Vulcanizers, quick-opening doors, ASME 120#. 1—Farrel 500/1500 HP Horiz. Reducer. PERRY EQUIPMENT CORP., 1424 N. 6th St., Phila. 22, Pa.

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4—Blaw Knox 6' x 40' Horizontal Vulcanizers with quick-opening doors, 250# working pressure, ASME.
1—Bolling 3-roll Laboratory Calender, 8" x 16".
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1—Banbury Midget Mixer with 2 HP gear motor.
1—Farrel-Birmingham 3-roll Lab Calender, 6" x 12".
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World Production of Natural Rubber

(1,000 Long Tons)

	Malaya		Indonesia			
Year	Estate	Native	Estate	Native	All Other	Total
1953	341.8	232.6	301.8	390.4	458.4	1,725.0
1954	343.5	240.8	280.5	464.3	473.4	1,802.5
1955	352.9	286.2	261.3	472.4	521.2	1,895.0
1956	353.0	274.4	259.0	427.8	532.9	1,887.5
1957						
Jan.	36.1	27.3	23.8	22.7	45.1	155.0
Feb.	27.1	22.1	20.6	16.4	38.8	125.0
Mar.	26.0	21.1	19.7	46.1	52.2	165.0
Apr.	26.6	22.5	19.6	41.6	39.8	150.0
May	27.2	18.3	18.1	30.4	43.5	137.5
June	29.7	21.6	20.4	29.5	43.8	145.0
July	32.5	24.1	21.0	65.9	46.5	192.5
Aug.	33.0	23.2	21.8	52.4	44.8	175.0
Sept.	31.5	21.4	21.8	37.8	35.0	157.5
Oct.	33.4	22.6	22.2	32.8	54.0	165.0
Nov.	34.4	22.7	22.2	24.5	51.2	155.0
Dec.	32.4	22.1	21.1	32.4	62.0	170.0
Total	369.8	268.9	252.2	432.3	556.7	1,892.5
1958						
Jan.	35.8	25.4	22.5	11.5	52.5	145.0
Feb.	28.8	22.9	20.0	8.8	37.0	117.5
Mar.	28.4	20.3	19.7	27.5	46.5	142.5
Apr.	26.7	18.3	16.8	24.0	44.2	130.0

Source: Bureau of the Census, Industry Division, Chemicals Branch, United States Department of Commerce; Secretariat of the International Rubber Study Group.

World Production of Synthetic Rubber

(1,000 Long Tons)

Year	U.S.A.	Canada	Germany	Total
1953	848.4	80.9	6.3	935.6
1954	622.9	86.6	6.9	716.4
1955	970.5	103.9	10.9	1,085.3
1956	1,079.6	120.7	10.7	1,211.0
1957				
Jan.	94.3	11.1	0.9	106.2
Feb.	83.2	9.8	1.1	94.1
Mar.	93.9	11.1	1.1	106.1
Apr.	82.3	11.0	1.0	94.3
May	95.0	11.5	0.8	107.3
June	84.4	11.3	1.1	96.8
July	81.0	10.1	0.8	91.9
Aug.	93.4	11.0	1.1	105.6
Sept.	94.5	10.9	1.0	106.4
Oct.	106.4	11.4	1.1	118.9
Nov.	106.0	11.5	1.0	118.5
Dec.	103.8	11.5	0.6	115.9
Total	1,118.3	132.1	11.6	1,262.0
1958				
Jan.	102.7	10.9	1.8	115.4
Feb.	81.8	9.1	1.0	91.9
Mar.	83.6	11.3	1.2	96.2
Apr.	73.8	11.1	1.1	85.9

Source: Secretariat of the International Rubber Study Group; and Bureau of the Census, Industry Division, Chemicals Branch, United States Department of Commerce.

World Consumption of Natural Rubber

(1,000 Long Tons)

Year	United States	Eastern Europe and China	United Kingdom	Other Foreign	Total Foreign	Grand* Total
1953	553.5	101.9	206.6	753.0	1,061.5	1,615.0
1954	597.5	62.7	226.5	835.7	1,124.9	1,725.0
1955	634.8	56.2	246.3	900.2	1,202.7	1,837.5
1956						
Jan.	53.7	19.1	21.7	68.8	109.6	162.5
Feb.	50.2	28.2	17.9	63.2	109.3	160.0
Mar.	50.0	23.1	16.0	71.4	110.5	160.0
Apr.	47.4	22.7	18.4	70.1	111.2	160.0
May	48.3	27.0	14.5	68.6	110.1	157.5
June	43.6	30.0	16.1	73.8	119.9	162.5
July	38.3	23.4	14.7	70.9	109.0	147.5
Aug.	46.6	13.9	10.3	64.9	89.1	135.0
Sept.	44.1	25.1	14.5	73.5	113.1	157.5
Oct.	52.1	17.5	18.8	78.3	114.6	167.5
Nov.	43.0	32.0	15.7	72.1	119.8	162.5
Dec.	45.1	34.0	14.3	66.5	114.8	160.0
Total	562.1	295.0	192.8	841.7	1,330.4	1,892.5
1957						
Jan.	52.6	13.0	14.4	74.9	102.3	155.0
Feb.	46.4	19.9	14.5	72.7	107.1	152.5
Mar.	48.3	23.6	17.6	72.7	113.9	162.5
Apr.	45.4	32.2	13.6	76.6	122.4	167.5
May	46.5	10.3	14.5	79.3	104.1	150.6
June	41.3	25.4	17.2	74.8	117.4	158.7
July	39.7	25.3	14.0	76.2	115.5	155.0
Aug.	44.9	28.0	9.7	66.8	104.5	150.0
Sept.	43.7	18.7	18.1	78.4	115.2	157.5
Oct.	48.8	12.2	15.3	75.7	106.2	155.0
Nov.	43.8	19.2	15.1	....	108.8	152.5
Dec.	38.3	18.5	17.7	70.8	104.2	142.5
Total	539.8	263.5	181.6	885.5	1,330.2	1,870.0
1958						
Jan.	42.6	21.8	15.3	73.5	110.6	152.5
Feb.	36.7	30.5	16.1	71.5	118.1	155.0
Mar.	38.2	31.6	16.9	73.7	122.2	160.0
Apr.	36.6	...	13.4	...	....	165.0

Source: Bureau of the Census, Industry Division, Chemicals Branch, United States Department of Commerce; and Secretariat of the International Rubber Study Group.
*Estimated.

World Consumption of Synthetic Rubber*

(1,000 Long Tons)

Year	U.S.A.	Canada	United Kingdon	Total† Continent of Europe	World† Grand Total
1953	784.8	35.9	4.9	39.3	872.5
1954	636.7	30.1	8.7	50.8	740.0
1955	894.9	40.2	20.5	78.3	1,057.5
1956					
Jan.	78.5	4.0	3.1	9.0	100.0
Feb.	75.2	4.1	3.1	9.0	95.0
Mar.	78.3	4.1	3.1	9.0	97.5
Apr.	73.7	4.4	3.6	8.8	97.5
May	76.4	4.5	3.2	8.5	97.5
June	67.8	4.0	3.6	9.5	90.0
July	58.2	3.7	2.9	8.8	80.0
Aug.	72.5	3.3	2.3	7.5	90.0
Sept.	69.2	3.9	3.2	9.0	90.0
Oct.	82.0	4.2	4.1	10.8	105.0
Nov	71.5	4.3	3.9	10.5	95.0
Dec.	73.3	3.8	3.6	9.8	97.5
Total	877.3	48.4	39.5	110.5	1,135.0
1957					
Jan.	85.5	4.4	3.7	11.5	110.0
Feb.	77.9	4.2	3.9	11.3	102.5
Mar.	81.7	4.3	5.4	11.5	110.0
Apr.	76.4	4.2	4.0	12.3	102.5
May	80.2	4.7	4.8	12.5	107.5
June	70.5	4.2	5.5	12.3	97.5
July	69.0	3.5	4.3	14.0	97.5
Aug.	79.3	2.8	3.0	11.2	102.5
Sept.	77.7	3.7	6.4	14.0	110.0
Oct.	88.8	4.1	5.5	14.8	120.0
Nov.	75.4	4.0	5.0	14.0	105.0
Dec.	67.6	3.6	6.0	13.3	95.0
Total	929.3	47.5	57.4	154.8	1,262.5
1958					
Jan.	72.6	3.5	5.2	14.8	102.5
Feb.	64.2	3.5	5.2	14.3	92.5
Mar.	66.0	3.5	6.6	...	97.5
Apr.	66.6	3.8	4.7	...	95.0

Source: Secretariat of the International Rubber Study Group; Bureau of the Census, Industry Division, Chemical Branch, United States Department of Commerce.
* Includes latices.
† Figures estimated or partly estimated.

MACHINERY & SUPPLIES FOR SALE (Cont'd)

1—FARREL 16" X 48" 3-ROLL CALENDER; 1—THROPP 16" X 40" 2-roll mill, 50 HP; 1—Adamson combination 6" x 12" 3-roll calender and 2-roll mill; 1—National-Erie #2-3¼" extruder; also presses, cutters, vulcanizers, etc. CHEMICAL & PROCESS MACHINERY CORP., 52 Ninth Street, Brooklyn 15, N. Y.

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Phone: Butler 9-1000
Plants: Tallapoosa, Ga.; Butler, N.J.

U.S.A. Automotive Pneumatic Casings

(Thousands of Units)

	Shipments					
	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
Passenger Car						
1957						
Jan.	3,192	4,521	100	7,812	8,296	16,978
Feb.	3,017	4,453	68	7,538	8,047	17,376
Mar.	3,051	4,875	80	8,006	8,629	18,065
Apr.	2,809	5,218	78	8,104	7,878	17,821
May	2,831	5,166	60	8,057	8,313	18,050
June	2,623	5,532	63	8,217	7,462	17,322
July	2,719	5,826	65	8,611	7,449	16,097
Aug.	2,886	5,675	66	8,627	7,801	15,348
Sept.	1,398	5,096	70	6,564	7,535	16,310
Oct.	2,298	4,392	88	6,778	8,437	17,998
Nov.	3,179	3,250	62	6,491	6,575	15,596
Dec.	2,803	2,858	78	5,739	6,597	19,818
Total	32,724	56,605	888	90,217	93,547	19,818
1958						
Jan.	2,376	4,838	50	7,264	6,740	19,298
Feb.	1,998	3,777	57.5	5,833	6,320	19,820
Mar.	1,845	4,726	49.3	6,621	6,569	19,786
Apr.	1,594	5,517	61.4	7,173	6,522	19,051
May	1,874	5,593	55.8	7,523	6,715	18,263
Truck and Bus						
1957						
Jan.	305	678	83	1,066	1,208	3,512
Feb.	344	598	59	1,001	1,122	3,633
Mar.	330	704	74	1,107	1,136	3,678
Apr.	438	771	49	1,277	1,072	3,486
May	399	620	74	1,094	1,178	3,580
June	370	715	64	1,149	1,027	3,461
July	349	819	61	1,229	994	3,219
Aug.	328	813	65	1,206	1,117	3,129
Sept.	290	805	63	1,158	1,105	3,083
Oct.	322	959	94	1,375	1,271	2,987
Nov.	337	626	59	1,021	1,060	3,207
Dec.	266	484	70	820	1,018	3,408
Total	4,041	8,544	845	13,430	13,394	3,408
1958						
Jan.	277	674	57	1,007	1,074	3,470
Feb.	254	598	52	904	994	3,572
Mar.	269	608	46	923	1,004	3,659
Apr.	282	666	55	1,002	955	3,607
May	299	626	54	980	938	3,571
Total Automotive						
1957						
Jan.	3,496	5,199	183	8,878	9,504	20,490
Feb.	3,361	5,052	127	8,539	9,169	21,009
Mar.	3,381	5,579	154	9,114	9,766	21,743
Apr.	3,246	5,989	146	9,381	8,950	21,308
May	3,230	5,787	134	9,150	9,490	21,630
June	2,993	6,247	127	9,366	8,489	20,783
July	3,068	6,646	126	9,840	8,443	19,316
Aug.	3,214	6,488	130	9,833	8,917	18,477
Sept.	1,688	5,902	133	7,723	8,641	19,393
Oct.	2,620	5,351	182	8,154	9,708	20,985
Nov.	3,516	3,876	121	7,513	7,636	18,803
Dec.	3,070	3,341	148	6,559	7,615	23,225
Total	36,764	65,150	1,734	103,647	106,941	23,225
1958						
Jan.	3,653	5,511	107	8,271	7,814	22,769
Feb.	2,253	4,374	110	6,737	7,314	23,392
Mar	2,114	5,334	95	7,543	7,573	23,446
Apr.	1,876	6,183	116	8,175	7,477	22,658
May	2,173	6,220	110	8,503	7,652	21,834

Source: The Rubber Manufacturers Association, Inc.

U.S.A. Rubber Use by Products

(1,000 Long Tons)

	Transportation			Non-Transportation			
Year	Natural	Synthetic	Total	Natural	Synthetic	Total	Grand Total
1957							
1st q.	94.8	152.9	247.7	52.5	91.5	144.0	391.7
2nd q.	85.4	142.7	228.1	47.8	84.3	132.1	360.2
3rd q.	81.7	143.6	225.3	46.7	82.2	129.1	354.4
4th q.	80.9	154.1	225.0	50.0	87.7	137.7	362.7
Year	342.7	583.5	926.2	197.0	345.8	542.9	1,469.0
1958							
1st q.	72.4	128.6	201.0	45.1	74.2	119.4	320.4

Source: Secretariat of the International Rubber Study Group.

U.S.A. Rubber Industry Employment, Wages, Hours

Year	Production Workers (1000's)	Average Weekly Earnings	Average Weekly Hours	Average Hourly Earnings	Consumer's Price Index
		All Rubber Products			
1939	121.0	$27.84	39.9	$0.75	
1955	214.7	87.15	41.7	2.09	114.5
1956	211.1	87.23	40.2	2.17	116.2
1957					
Jan.	216.0	91.21	40.9	2.23	118.2
Feb.	212.6	90.80	40.9	2.22	118.7
Mar.	211.4	89.28	40.4	2.21	118.9
Apr.	191.3	87.60	40.0	2.19	119.3
May	204.6	88.80	40.0	2.22	119.6
June	196.8	91.21	40.9	2.23	120.2
July	199.9	94.16	41.3	2.28	120.8
Aug.	204.3	92.84	40.9	2.27	121.0
Sept.	206.4	93.02	40.8	2.29	121.1
Oct.	209.5	93.03	40.1	2.32	121.1
Nov.	209.0	93.20	40.0	2.33	121.6
Dec.	207.3	92.40	40.0	2.31	121.6
1958					
Jan.	260.5	87.48	38.2	2.29	122.3
Feb.	256.9	85.04	37.3	2.28	122.5
Mar.	242.9	87.02	38.0	2.29	123.3
		Tires and Tubes			
1939	54.2	$33.36	35.0	$0.96	
1955	88.6	101.09	41.6	2.43	
1956	85.2	100.95	39.9	2.53	
1957					
Jan.	87.4	107.64	41.4	2.60	
Feb.	86.8	106.19	41.0	2.59	
Mar.	86.9	102.40	40.0	2.56	
Apr.	71.1	103.46	40.1	2.58	
May	84.9	103.46	40.1	2.58	
June	78.2	107.23	41.4	2.59	
July	84.4	112.20	42.5	2.64	
Aug.	84.2	107.83	41.0	2.63	
Sept.	84.4	107.20	40.3	2.66	
Oct.	84.4	105.18	39.1	2.69	
Nov.	84.0	106.62	39.2	2.72	
Dec.	83.6	105.84	39.2	2.70	
1958					
Jan.	109.2	98.52	36.9	2.67	
Feb.	105.6	93.02	35.1	2.65	
Mar.	102.4	97.79	36.9	2.65	
		Rubber Footwear			
1939	14.8	$22.80	37.5	$0.61	
1955	18.2	70.70	40.4	1.75	
1956	19.8	71.89	39.5	1.82	
1957					
Jan.	18.3	71.76	39.0	1.84	
Feb.	17.8	72.10	39.4	1.83	
Mar.	17.8	72.86	39.5	1.84	
Apr.	17.5	70.64	38.6	1.83	
May	17.3	71.92	39.3	1.83	
June	17.4	72.29	39.5	1.83	
July	16.9	72.13	39.2	1.84	
Aug.	17.2	73.05	39.7	1.84	
Sept.	17.6	74.45	39.6	1.88	
Oct.	17.7	76.02	39.8	1.91	
Nov.	18.0	78.96	40.7	1.94	
Dec.	17.9	79.35	40.9	1.94	
1958					
Jan.	21.8	74.87	39.2	1.91	
Feb.	21.5	74.68	39.1	1.91	
Mar.	21.1	77.01	39.9	1.93	
		Other Rubber Products			
1939	51.9	$23.34	38.9	$0.61	
1955	107.9	78.35	41.9	1.87	
1956	106.1	78.96	40.7	1.94	
1957					
Jan.	110.3	81.39	40.9	1.99	
Feb.	108.0	81.18	41.0	1.98	
Mar.	106.7	81.19	40.8	1.99	
Apr.	102.7	79.60	40.2	1.98	
May	102.2	79.80	40.1	1.99	
June	101.2	81.81	40.7	2.01	
July	98.6	82.62	40.7	2.03	
Aug.	102.9	83.84	41.1	2.04	
Sept.	104.4	85.08	41.1	2.07	
Oct.	107.4	86.10	41.0	2.10	
Nov.	107.0	85.05	40.5	2.10	
Dec.	105.8	84.03	40.4	2.08	
1958					
Jan.	129.5	80.94	39.1	2.07	
Feb.	123.8	80.32	38.8	2.07	
Mar.	119.4	80.08	38.5	2.08	

Source: BLS, United States Department of Labor.

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